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PROGRAMS

Cover art by James Regan; photography by Christopher Gould and Michael R. Davila

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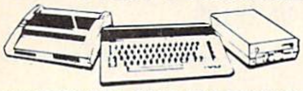
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VIEW FROM THE BRIDGE

In the computer industry as in any other, it's the consumers, and to a lesser extent the manufacturers, who set the trends, We in the journalistic end of the business have no role in setting trends. We just follow them—though we do get to do so in a manner consistent with our audience.

In our particular case, that audience has always tended towards the more advanced end of the user spectrum. So the contents of *Ahoy!* has been more technical than that of most Commodore magazines. And that's not going to change.

But the Commodore industry is changing. As we've observed over the past months, fewer and fewer companies are including the C-64 and C-128 in their future plans. While a steady flow of games will continue, new database managers, assemblers, and disk drives will trickle in slowly. There have been months of late when we've had difficulty filling our *Reviews* section with worthwhile new utilities and productivity packages.

We're reminded of how, towards the end of the VIC 20's descent into oblivion, we searched frantically for new VIC products to announce and review, new VIC programs to publish. We wound up including almost everything that came our way, much of it substandard. We've decided not to make the same mistake again.

Beginning this issue, game and nongame reviews will share a single *Reviews* section. There will be months when there are four or five new nonentertainment products worthy of attention—and when there are that many, they'll dominate the section. When there are only one or two, we'll devote most of the space to the newest games. We're certain that the added flexibility will enable us to produce a *Reviews* section that's more satisfying all the way around.

About as satisfying, we hope, as the contents of the November *Ahoy!*:

• Maybe you pooh-poohed Dale Rupert's proclamation in the September issue that you and he would build a working BASIC compiler over the course of several installments of the *Rupert Report*. If so, we hope this issue's third incarnation of *Mini-comp* makes you a believer. Much work remains to be done to turn the program into one of professional quality, but Dale starts you off on your programming odyssey in this month's *Compiling Strings*. (Turn to page 20.)

• *Sack Race* provides all the thrills and excitement of being a supermarket bagboy—except for dating the cashiers. (Turn to page 15.)

• If you desire a more exotic locale, *Island Quest* provides an ocean full of them. Bob Blackmer's gameplay is at its usual addictive level throughout this aquatic adventure. (Turn to page 15.)

• Just when you thought we'd supplied you with all the BASIC 7.0 enhancements you could ever use (in past programs too numerous to list), along comes Peter M.L. Lottrup's *Easy80* and its seven commands and two functions for controlling VDC memory. (Turn to page 45.)

• No matter how comprehensive your library of original and borrowed subroutines, you're only as efficient as the program you use to link the fool things together. John K. Lunde's *Insert* will let you mix, match, and meld with undreamed-of versatility. (Turn to page 48.)

• If you're a subscriber, you've already noticed the burgundy and white section bound between our inside front cover and contents page—the *Ahoy! Access Club Clipper*, containing discounts and special offers from companies like Montgomery Grant, Lyco, Software Support, and many others. As well, there's a list of retail outlets around the country offering discounts to holders of the *Ahoy!* Access Club Card. To learn how to become a member and take advantage of these offers, see page 27.

You'll find all your other favorite features inside as well. Please write or call us with any comments. —***David Allikas***

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Star Micronics' Commodore-compatible NX1000C Rainbow color printer at right, shown with its IBM-compatible counterpart. Speed ranges from 36 to 144 cps.

SMOOTH SAILING

As reported in the *Wall Street Journal* on August 10, Commodore's net income for its quarter ended June 30 was $12.2 million (38¢ a share), representing a sixfold increase over the $2.1 million (6¢ a share) earned during the same quarter a year earlier. Sales increased from $190.4 to $215.2 million, or 13%. For the year, net nearly doubled to $55.8 million ($1.75 a share) from fiscal 1987's $28.6 million (89¢ a share).

In the world of big business, this may be nothing to fax your broker about. But it's impressive when you recall—if you can recall—Commodore's five consecutive losing quarters a couple of years back, during which they dropped $273 million and seemingly came as close to bankruptcy as a company can without actually closing its doors.

The company's return to stability is good news for all Commodore users. But don't assume that a Second Golden Age of the 64 is dawning—the *Journal* correctly attributed Commodore's surge to strong Amiga sales. So the trickle-down to 8-bit users in terms of new development will be slight. But slight is better than non-existent.

If you're a C-64 or C-128 owner, we recommend that you serve notice on Commodore that, just as was the case with them, rumors of your death were greatly exaggerated. You're alive and kicking—and computing on your 8-bit machine. Better yet, have each member of your user group write an individual letter, and mail them to Commodore in one large envelope. And don't stop with Commodore—write to the large software houses from whom you'd like to see more than just games. That kind of strong evidence of consumer interest can make a different in what you see for your machine in the future.

Commodore International, 215-431-9100 (see address list, page 14).
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Super 81 Utilities is a complete utilities package for the 1581 disk drive and C128 computer. Among the many Super 81 Utilities features are:

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- Copy 1581 files to 1571 disks
- Backup 1581 disks or files with 1 or 2 1581's
- 1581 Disk Editor, Drive Monitor, RAM Writer
- Supplied on both 3½" and 5¼" diskettes so that it will load on either the 1571 or 1581 drive
- Perform many CP/M and MS-DOS utility functions
- perform numerous DOS functions such as rename a disk, rename a file, scratch or unscratch files, lock or unlock files, create auto-boot and much more!

Super 81 Utilities uses an option window to display all choices available at any given time. A full featured disk utilities system for the 1581. only $29.00

RAMDOS RAMDOS is a complete RAM based "Disk" Operating System for the Commodore 1700 and 1750 RAM expansion modules which turns all or part of the expansion memory into a lighting fast RAM-DISK. RAMDOS behaves similar to a much faster 1541 or 1571 floppy disk except that the data is held in expansion RAM and not on disk. Under RAMDOS, a 50K program can be loaded in ½ second. Programs and files can be transferred to and from disk with a single command. RAMDOS is available for only $29.00

PROFESSIONAL CAD FOR YOUR COMMODORE 128! — HOME DESIGNER

This is the most powerful two-dimensional CAD program available for your C128! As an object-based package (this is what the professionals use) your drawings are created and printed with the **greatest accuracy and detail possible.** This object-based design provides extreme flexibility and control over your drawings because each line, circle, text-string, etc. can be manipulated (rotated, enlarged, erased) as a separate entity. **With over 50 powerful commands,** you can translate, rotate and mirror objects. Stretch or shorten lines as needed. Easily create parallel lines. Draw or erase arcs, circles, ellipses and boxes at will. Insert library figures anywhere into drawings at any scale and angle. Scale text to any height and width. Work in either an absolute scale or feet/inches. Your drawing screen (a 16" by 22" page) includes **5 drawing layers** that can be selected/included/excluded/erased at will. HOME DESIGNER provides **accurate, lazer-quality output, at ANY scale, on your dot matrix printer or plotter.** Use a joystick or the 1351 mouse as input.

WHEN THE DETAILS ARE IMPORTANT! **Still only $45.00**

THE WRITE STUFF — WRITER & TALKER

This WORDPROCESSOR is by far one of the BEST that we have seen! Let's get right to the specs: 21 function calculator - line up numbers with the decimal tab; 60 customizable help screens - 86K of disk doc's; Double-column printing in one pass; Encyrpt/decrypt text; Sort up to ten columns (great for lists); Merge/Append text files; Link files; Word/paragraph counter; File translator for 15 other W/P's; Dvorak [- -] QWERTY toggle; True 80 column Hi-Res preview; Key-click for typewriter sound; Mail Merge; Automatic Case; On-line clock; 1764 RAM Expander support; MACRO TYPING cuts your typing time by over 25% and more!

The WRITE STUFF even comes in a TALKING version, which includes SAM, a program that produces speech from your computer's sound capabilities. This BB TALKER recites any portion of your text, can say each letter and command as it is typed, and translates to phonetic script for additional editing. **Great for the sight-impaired and the youngsters!!**

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ing towels ($5.95 retail) will be included with every specially marked 10-pack of MF2HD 3½" disks through October 3 or while supplies last.

Fuji Photo Film U.S.A., Inc., 800-FOR-FUJI (see address list, page 14).
Circle #133 on Reader Service Card

MACROS

For use on the C-64 with Commodore's Assembler Development System (C.A.D.S.), *Macro Set 1* ($35.00) consists of over 100 assembler macros and subroutines. They're designed to speed up program development by reducing time spent in the design, coding, key entry, and testing associated with serial I/O, keyboard and screen I/O, large number arithmetic, and the like. The set, supplied as six files of source code, contains over 4000 lines of code which generate about 11,000 bytes of object code. It works with all DOS-compatible disks, including those with hardware modifications. An 81-page reference guide is included.

Xytec, 415-563-0660 (see address list, page 14).
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Don't be caught at sea the next time you need valuable programming information from a back issue of *Ahoy!* Our official binders turn a year's worth of *Ahoy!* into a textbook on Commodore computing! These quality-constructed binders use metal rods to hold each magazine individually, allowing easy reference to any issue without removal. Sporting a navy blue casing with a gold *Ahoy!* logo imprinted on the spine, these binders will be the pride of your computer bookshelf.

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(Outside Continental US add $2.50 per binder. Allow 4 to 6 weeks for delivery.)

RENEGADE ARRIVES

Advertised for the past several months but just released at press time, *Renegade* ($34.95) offers a variety of archiving utilities, including single/dual high speed data copier and nibbler, G.E.O.S. sector editor, and over 225 individual parameters. Additional parameters will be made available every two months, and updates three times a year.

(The arrival at this office of a new product usually follows by a month or more the press release heralding it–so we rarely get the chance to sample a new product in time to include any sort of value judgment in *Scuttlebutt.* In the case of *Renegade,* however, we got the chance–and all indications are that it will be a utility package of major significance. See Morton Kevelson's full-length review next month.)

Software Support, 206-695-9648 (see address list, page 14).
Circle #135 on Reader Service Card

COMPUTER CRAYONS

Co-created by Polarware and the Children's Television Workshop, the *Sesame Street Crayon* series of computer coloring books has been newly converted to the C-64. In *Letters for You, Numbers Count,* and *Opposites Attract* ($14.95 each), Big Bird, the Cookie Monster, Grover, and Bert and Ernie introduce children to ABC's, numbers, and opposites. Each contains dozens of pictures that can be colored over and over by pointing and clicking with a joystick, mouse, or keyboard. Finished pictures can be printed in color on the Okimate 20 or in black and white on the Commodore 1200.

Polarware, 312-232-1984 (see address list, page 14).
Circle #136 on Reader Service Card

HELP FOR DROPOUTS

Mindscape's *Students at Risk: How Computers and Software Can Help* presents an overview of school- and community-based programs around the country fighting the dropout problem and lists appropriate computer software being used for at-risk students. The booklet is available free of charge to educators.

Mindscape Inc., 312-480-7667 (see address list, page 14).
Circle #137 on Reader Service Card

BROWN BOX DRIVER

QDisk version 2.0 is a device driver for the *Quick Brown Box* battery-backed CMOS static RAM cartridge which allows it to be used as a non-volatile RAM disk in C-128 CP/M mode. *QDisk* is application-transparent and can be used with standard CP/M software. Additionally, *QDisk* allows partitioning of the 64K *Quick Brown Box* into two 32K areas, either of which can be used for C-64/128 native mode applications or both of which can be used as separate CP/M drives. Once the driver is installed, the *Quick Brown Box* can be accessed as a normal CP/M drive; however, unlike the standard C-128 CP/M RAM disk using the 1700/1750 RAM expander, *QDisk* does not lose its contents when the computer is turned off. Price is $9.95 plus $2.00 shipping.

Herne Data Systems Ltd., 416-535-9335 (see address list, page 14).
Circle #138 on Reader Service Card

PICK 4

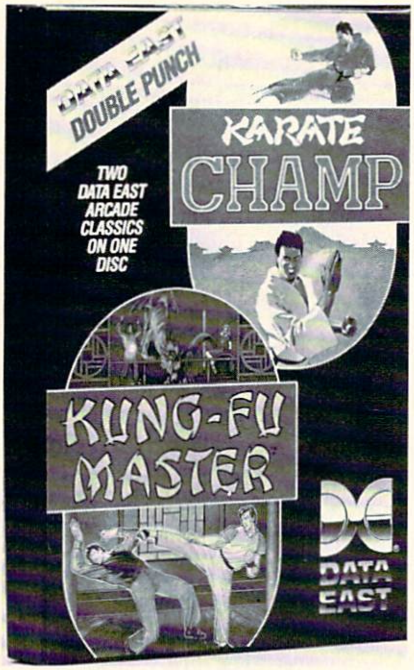
Software Exchange has released four new programs designed to let racing enthusiasts handicap thoroughbred, harness, greyhound, and quarter horse races with information found in the daily racing form. The systems require a maximum of 17 data entries per horse or dog to perform the statistical analysis that will forecast the outcome of a race. The four packages are the *Advanced Thoroughbred Racing System* ($64.95), the *Advanced Harness Racing System* ($64.95), the *Advanced Greyhound Racing System* ($74.95), and the *Enhanced Quarter Horse System* ($64.95). Specify C-64 when ordering, and add $3.00 per program for shipping.

Software Exchange, 800-527-9467 (orders) or 313-626-7208 (see address list, page 14).
Circle #142 on Reader Service Card

GAMES

Except where indicated, all of the following games are for the Commodore 64 (and the C-128 in 64 mode).

In the design of *Emlyn Hughes International Soccer,* Audiogenic proudly admits to having imitated the graphics of Commodore's classic *Internation-*



Enter the bargain: a pair of martial arts hits for half the price of one.

al Soccer while adding a more powerful control system, more realistic animation, and a strategy section.

Audiogenic (see address list, page 14).

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Karate Champ and *Kung Fu Master,* originally sold at $29.95 each, have been bundled by Data East into a single two-disk package for $14.95. The former requires the player to combine lunges, kicks, spins, somersaults, foot sweeps, reverse punches, and defensive blocks into a successful title defense against human or computer-controlled opponents. In the former, the player battles demons and martial arts experts to rescue a captive maiden from a wizard's castle.

Data East, 408-286-7074 (see address list, page 14).

Circle #144 on Reader Service Card

SSI's two-disk *Battles of Napoleon* ($49.95) advanced wargame and construction set will allow players to simulate practically any Napoleonic engagement, real or imaginary, on a detailed tactical level. You may use the computer to generate random maps and then modify them, or build maps square by square. Terrain options include five levels of elevation, woods, roads, swamps, and more. New armies can be created, or the supplied ones can be adjusted to suit personal specifications. Premade scenarios are also included, highlighting the battles of Waterloo, Quatre Bras, Auerstadt, and Borodino. Distributed by Electronic Arts.

Strategic Simulations Inc., 415-964-1353 (see address list, page 14).

Circle #145 on Reader Service Card

Also distributed by EA and also starring the Little Emperor, Datasoft's *Napoleon in Russia–Borodino 1812* ($34.95) recreates the battle which led to Napoleon's overthrow. Taking the place of Napoleon, the player can either allow the Russian army to escape and ultimately drive him back across Europe, or change history and defeat the Russians. With control over infantry, cavalry, and artillery, players can practice with short skirmishes or jump right into the three-day Borodino fray. Extra touches include scrolling battle maps recreated from actual Russian military cartography, tactical hints, and options concerning fatigue, morale levels, and battle speed.

Electronic Arts, 415-571-7171 (see address list, page 14).

Circle #146 on Reader Service Card

Gaines Mill to Chattanooga, Volume II in Strategic Studies Group's *Decisive Battles of the American Civil War* series, recreates five confrontations from the war's middle years: Gaines Mill, Stones River, Gettysburg, Chickamauga, and Chattanooga. As commanders, players are confronted with the problems of the pre-radio battlefield, and must provide successful solutions to each scenario. The *Decisive Battles* series utilizes Warpaint, a graphics editor for customizing game icons, and Warplan, a complete wargame construction kit. Distributed by Electronic Arts.

Electronic Arts, 415-571-7171 (see address list, page 14).

Circle #147 on Reader Service Card

Western Games ($29.95) lets you compete in down-home events like Armwrestling, Beershooting (fire at tankards held by the town idiots), Quidspitting (expectorate your chew-tobacco into a pan), Dancing (imitate the moves of the saloon go-go girl), Milking, and Eating.

Digitek, Inc., 813-933-8023 (see address list, page 14.)

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Paragon Software has signed an exclusive agreement with Game Designers' Workshop to bring *Traveller,* the science fiction role playing game, to the home computer. The first adventure in the series will focus on a sparsely settled area of the Imperium called the Spinward Marches, surrounded with cultures often characterized as "other than friendly." The computer game will appear first for the Amiga and IBM PC around March 1989, with a C-64 version to follow.

Paragon Software, 412-838-1166 (see address list, page 14.)
Circle #152 on Reader Service Card

Five arcade hits converted to the C-64 by Taito:

As *Rastan* ($34.95) the warrior lord, you live in a mythical land of adventure, with death always just a fire-breathing dragon away. Your goal is to capture life-giving magical power signs and conquer the Castle King.

Renegade ($34.95) places you on the streets of a city infested by bloodthirsty gangs. Only your karate skills can put the punks in their place–face down in the gutter.

In *Bubble Bobble* ($34.95) you must help two dinosaur friends escape monsters and burst their way through 100 screens filled with bubbles.

Best described as an enhanced *Blockbuster, Arkanoid* ($29.95) offers 33 screens of action.

In the 21st century gameworld of *Alcon* ($29.95), you and a top secret experimental SW475 Starfighter are your planet's only hope of surviving an alien invasion.

Taito Software Inc., 604-984-3344 (see address list, page 14.)
Circle #153 on Reader Service Card

DRAG RACE PRACTICE

PC Tree ($34.95) simulates the rack of lights used to start drag races, usually consisting of three amber lights stacked atop one green light. The driver's goal is to start his car between the time the third amber light goes off and the green light goes on. With the software, dragsters can improve their reaction time, using either a .400 PRO or .500 FULL tree. Individual reaction timers allow simultaneous practice by two users, via two joysticks or the keyboard. Features include two large digital readout windows, prestage and stage sequence, random start, and a digital rollout adjustment from .000 to .899. The program automatically calculates and displays your average reaction time. Add $3.00 for shipping; PA residents add 6% tax to total.

Family Software, 215-497-5561 (see address list, page 14.)
Circle #154 on Reader Service Card

MIDI CLASS

A six-part class on Building MIDI Programs will be offered for the second time this spring in New York City, and once each spring and fall thereafter. Topics covered include mappers and simple MIDI processors, building a librarian and voice editor, and building a sequencer. The price is $250.

MUSIG, 212-246-7438 (see address list, page 14.)
Circle #155 on Reader Service Card

LIFESTYLE SOFTWARE

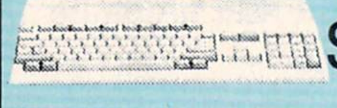
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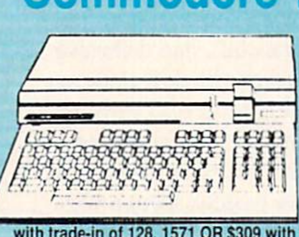
Products - Used

C64 CPU	$119	C128 CPU	$199
VIC-20 CPU	$35	1541 Drive	$125
1571 Drive	$189	Vicmodem 64/128	$25
Hayes Smartmodem	$39	MPS 801 Printer	$72
VIC 1525 Printer	$79	Diablo 630 Printer	$249
Okimate color w/PIP	$99	C1702 Monitor	$135
C1802C Monitor	$149	Monitors from	$39
Commodore C2N	$20	DSI PPI Interface	$32
Xetec Interface	$25	Software/Books from	$1

Products - New

Amiga 2000 CPU	$1549	Amiga 2010 Int.	$179
C1084 RGB Monitor	$299	Master 3A (A1010)	$185
A1010 Drive	$199	Bridge Card w/Drive	$509
A20MB Hard Drive	$509	Avatex 1200HC	$99
Avatex 2400HC	$189	SmartLink 2400HC	$179
Star NX-1000 144cps	$189	Star NX-1000 Color	$249
128D CPU	$449	64C CPU	$159
PC-10 III	$679	Colt PC Turbo	$719
1541-II Drive	$179	1581 Drive	$179

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- Many useful, timesaving features (DOS Wedge, screen dump, resident monitor).
- No loss of compatibility.
- Far too many features to list in this ad . . . and perhaps in this magazine! (Call or write to get all the details!)

. . . and if you want the ultimate, get RapiDOS Professional!

- Gives even faster disk access!
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- Provides 40 track extension (749 blocks free!)
- Adds 20 new disk commands (i.e., lock files, change disk name).

Here's what people are saying about RapiDOS:

Mike J. Henry (Basement Boys Software) - *"It's amazing how incredibly fast it is, I'm impressed!"*
Mitch S. (Eaglesoft Inc.) - *"Very fast, very reliable, and very compatible. I love it!"*
J.F. Jones (ADP) - *"Superbases' speed is increased greatly, and it's now a dream to use!"*

Function	Normal DOS	RapiDOS	RapiDOS Pro	Your System
Load 202 blocks	128 sec.	15 sec.	3 sec.	
Save 202 blocks	196 sec.	98 sec.	8 sec.	
Format 35 tracks	90 sec.	24 sec.	18 sec.	

Compare these speeds with your current system and see why RapiDOS puts the C-64 into a different league!

RapiDOS requires a socketed kernal ROM U4, and is available in versions for the 64c, 128 in 64 mode, and 1541c (please specify when ordering). RapiDOS is easily upgradeable to the Professional Version. RapiDOS Professional drive controller is **(c) '87 mts data GbR,** the creators of the best European parallel systems.

At these affordable prices no C-64 owner should be without RapiDOS!

RapiDOS $49.95 **RapiDOS Professional $99.95**

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- For the C64/128 with a single 1541 disk drive.
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- Gives the 64 'Burst Mode' when used with a 1571 or 1581 disk drive!
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- Simple installation. (Kernal ROM U4 must be socketed) **$39.95**

C-128 BURST-ROM

- Lets the 128 run at 'Burst' speed when in 64 mode!
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Associates and 1 Step Software with the goal of helping retail channels to establish a category of "lifestyle" software—cooking, grooming, health, and the like. At this point, most of the company's product line consists of repackaged versions of various recipe programs formerly distributed by CDA and 1 Step. Prices range from $9.99 to $65.00.

Lifestyle Publishing Group, 904-825-0220 (see address list, this page).
Circle #158 on Reader Service Card

SAVE!

Broderbund has lowered the price of their *Type!* touch-typing program for the 64 from $39.95 to $19.95. School Edition (Teacher's Guide plus backup disk) is $29.95; Lab Pack (Teacher's Guide plus five disks) is $59.95.

Broderbund Software, 415-492-3200 (see address list, this page).
Circle #141 on Reader Service Card

FLIGHT BOOK

Gunship: 82 Challenging New Adventures consists of aviation scenarios which the C-64 user can recreate with MicroProse's *Gunship* or Cosmi's *Super Huey* helicopter simulators (as well as *ThunderChopper* and *Helicopter Simulator*). 208 pages; $12.95.



The price of Type!, *Broderbund's keyboard tutor, has been dropped to $19.95.*

•TAB Books Inc. (see address list, this page).
Circle #159 on Reader Service Card

GLOBAL SEARCHES

Two sneaky new programs that teach geography while kids think they're playing an adventure game:

The first C-64 release in Polarware's *Spy's Adventures Around the World* series, *The Spy's Adventures in North America* ($17.95) sends the player in search of Dr. X, who's stolen documents vital to the security of the United States. The fiendish doctor may be hiding anywhere from Alaska to Mexico; as you search, you'll learn the lay of the land. The adventure can be played by a lone gamer, or by up to six people in a spy against spy network or a cooperative spy network.

Polarware, 312-232-1984 (see address list, this page).
Circle #139 on Reader Service Card

Following her previous crime sprees around the world and through the USA, *Where in Europe is Carmen Sandiego?* ($39.95) leads you through 34 countries where Carmen and her cronies are stealing national treasures. Included is a Rand McNally Concise Atlas of Europe, an online database, and a Crimestopper's Notebook. Educators can buy the School Edition ($49.95), containing a backup disk and a Teacher's Guide; or the Lab Pack ($99.95), consisting of five disks and the Guide.

Broderbund Software, 415-492-3200 (see address list, this page).
Circle #140 on Reader Service Card

TELECOM BOOK

The *Handbook of Computer-Communications Standards* (three volumes, $34.95 each) covers the major standard protocol topics, providing the introductory and tutorial text material missing from the actual standards themselves.

Howard W. Sams & Company, 317-298-5400 (see address list, this page).
Circle #163 on Reader Service Card

IC PROJECTS

50 CMOS IC Projects ($16.95) consists of digital electronics projects based on the complementary metal-oxide semiconductor family of circuits. (The IC's are popular because they are inexpensive and used with a wide range of voltages.) Schematics and parts lists accompany each project.

TAB Books, 717-794-2191 (see address list, this page.)
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Companies Mentioned in Scuttlebutt

Audiogenic Software Ltd.
Winchester House, Canning Road, Wealdstone
Harrow, Middlesex
HA3 7SJ England

Broderbund Software
17 Paul Drive
San Rafael, CA 94903-2101
Phone: 415-492-3200

Commodore
1200 Wilson Drive
West Chester, PA 19380
Phone: 215-431-9100

Data East USA, Inc.
470 Needles Drive
San Jose, CA 95112
Phone: 408-286-7074

DigiTek, Inc.
10415 N. Florida Ave., Suite 410
Tampa, FL 33612
Phone: 813-933-8023

Dynacomp
178 Phillips Road
Webster, NY 14580
Phone: 716-671-6160

Electronic Arts
1820 Gateway Drive
San Mateo, CA 94404
Phone: 415-571-7171

Family Software
3164 Surrey Lane
Aston, PA 19014
Phone: 215-497-5561

Fuji Photo Film USA
555 Taxter Road
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Phone: 212-246-7438

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ISLAND QUEST

For the C-64

By Bob Blackmer

Island Quest is a graphic adventure game of discovery with a lively music score for the C-64. In each game, a new world will be created, providing you with hours of enjoyment on the high seas. The object of the game is to find all the buried treasure and locate your island home.

In the center of the screen display is your window to the world, the crosshair marking your exact position. Above the window is the time elapsed in the game. Because of the large size of the world map (16K), also provided is a sector map to the left of the display. This map is divided into 100 sectors, and a white dot will mark your position in the world.

To sail the seas, use a joystick in Port 2 and push in any of eight directions. While sailing, you may encounter bottles floating in the sea. These are valuable, as messages inside them will lead to treasure. There will be a clue listed on the screen that contains a reference to your sector map. You will find an island with buried treasure in the general area of the sector clue given.

When you discover an island, position the crosshair in the center of it and press the letter "D" on the keyboard. A hole will be dug and the result displayed in the message line below the window. If you have found treasure, a treasure chest will be displayed under your booty list on the right side of the screen. Some islands will have nothing buried on them, and the message line will so inform you. If you find your home, a flag will be planted to help you find it again later in the game. It would also help to make a note of the sector location. Always press the fire button after a message is displayed to continue the game.



PHOTO: MICHAEL R. DAVILA

After finding all the treasure, locate your home island and press the fire button and you will receive a musical salute to your success. Another way to judge your performance is to compete with others for best time.

Island Quest is written in machine language and must be entered using *Flankspeed*, the machine language entry program found on page 59. When you're done typing it in, be sure to save a copy.

Load the program by typing LOAD "ISLAND QUEST", 8,1 (tape users substitute ,1,1). Type SYS 49152 to start. □

SEE PROGRAM LISTING ON PAGE 64

SACK RACE

For the C-64

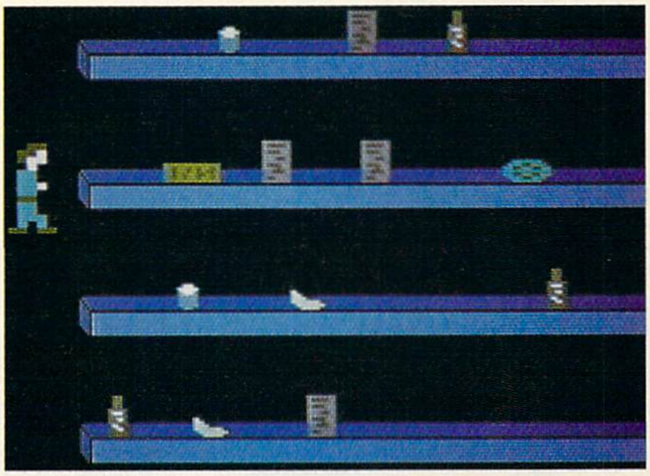
By John Fedor

It is a Monday at Jim Stevens' four-counter store, JIM'S. Business is slow, so to save money he sent all his baggers home for the day. He left himself in charge of sacking all the goods from the four counters. He forgot, however, about a great sale he put on certain items, and a large number of people came rushing into the store shortly after he sent the help home. The cashiers are moving as fast as possible, but Jim has to catch all the items hurtling down the counters towards him.

The task of bagging the items is quite easy. All he needs to do is touch the item and it is bagged. But the cashiers start pushing the items down the counter faster and faster, leaving little room for error. If an item reaches the end of the counter, Jim loses a bunch of customers. The customers do not appreciate their food falling on the floor. If Jim drops three items onto the ground, he is out of business.

PLAYING THE GAME

You control Jim with a joystick in Port 2. By moving the joystick left/right, you can choose the number of players (1 or 2). Press the fire button once this is done. Then each player chooses which level he/she wants to begin on (1-25). You get the bonus shown if you complete the level that you choose. This allows advanced players to skip the slower levels.


PHOTO: MICHAEL R. DAVILA

Which player is up is then displayed on the screen. Player 1 is green, while player 2 is blue. Move the joystick left/right to move the player in that direction. You can only move so far to the right (the cashiers don't like to be crowded). If you move the joystick up or down, you will be returned

Continued on page 50

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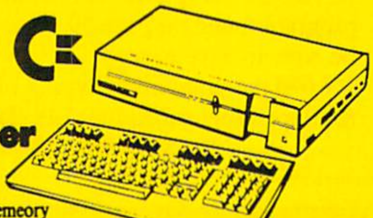
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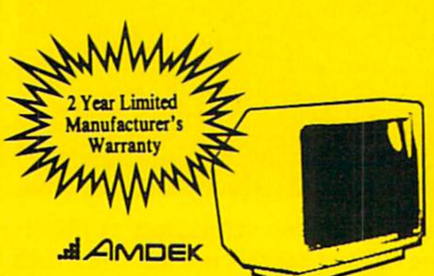
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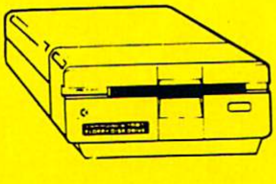
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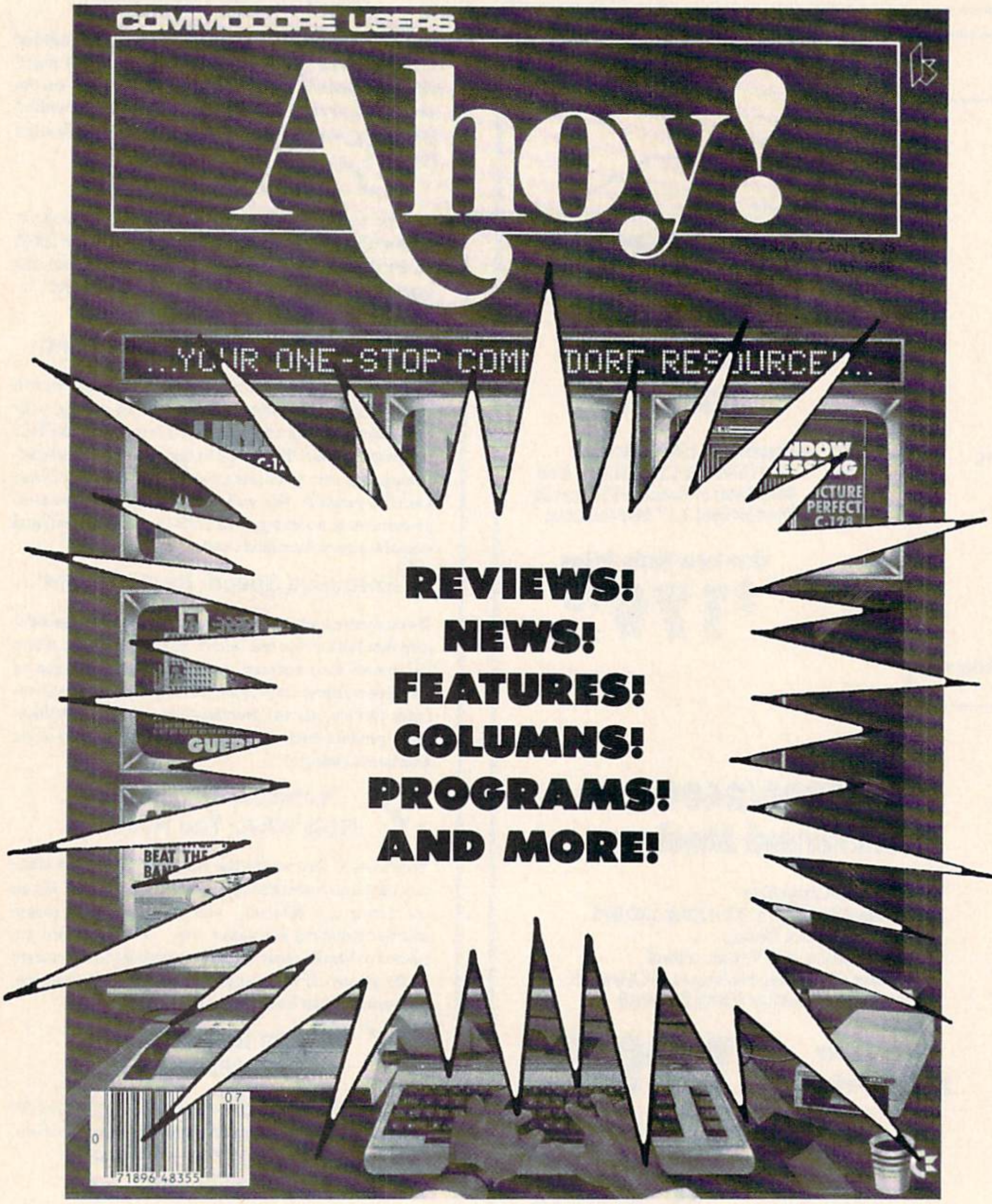
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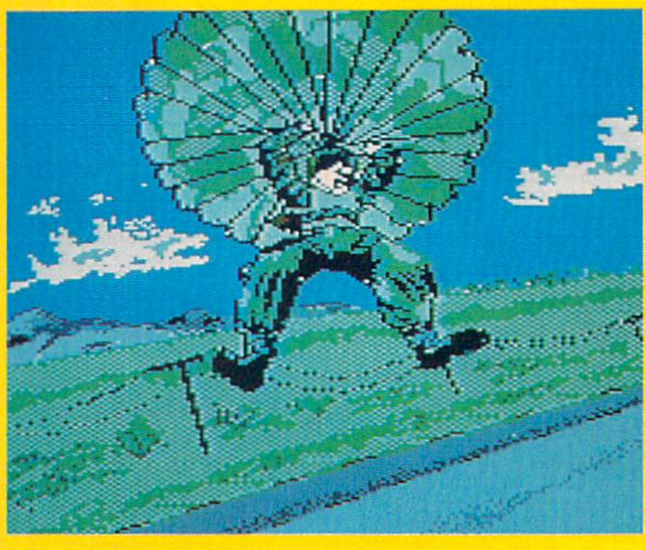
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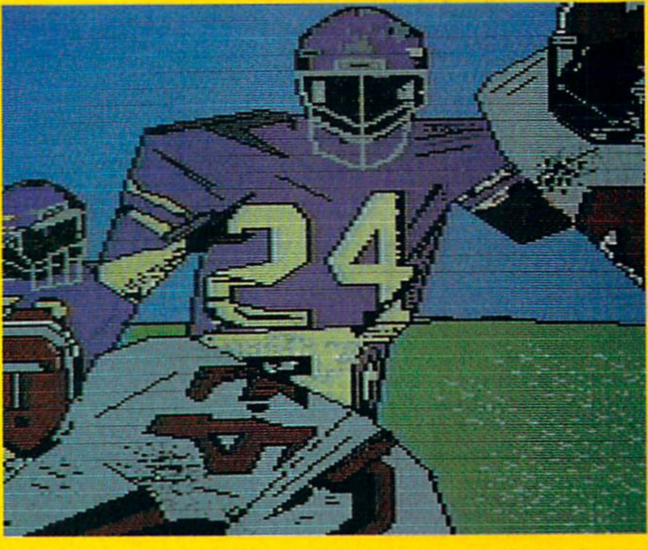
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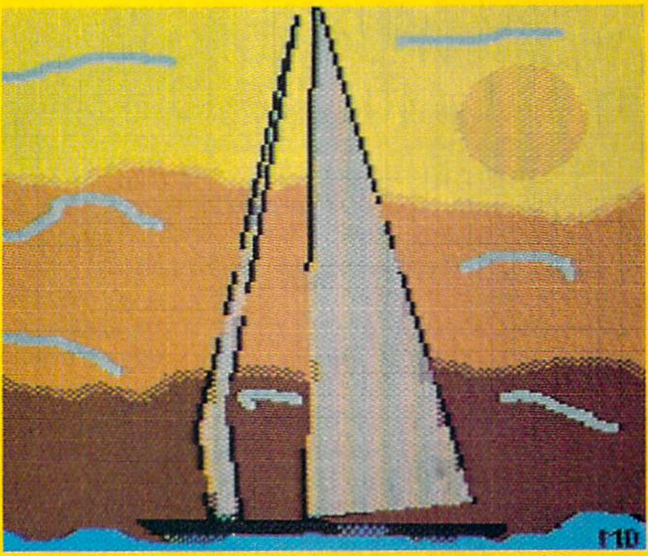
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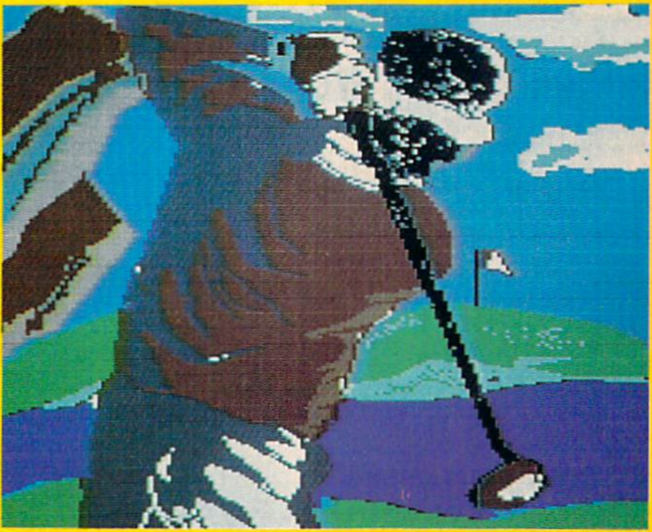
Note that the *Art Gallery* is not a contest. Published pictures are selected in an arbitrary and capricious fashion by the Art Director, based solely on their artistic merit.



It's too bad that all C-64 sports games can't feature screens as exciting as these reader-designed ones. Above: *Falling* (though perhaps too horizontally for the chutist's survival) by Brian Duffy (Braidwood, IL), a *Koala* light pen image. At right: first down is *TCU Football* by Gary Preston (Snyder, TX), on *Blazing Paddles;* second is *Sailing* by an unknown author (who is invited to write us to receive the proper credit); and at bottom, *Golfer,* a second well above par image by Brian Duffy.







COMPILING STRINGS

Implementing String Variables in a BASIC Compiler

BY DALE RUPERT

In our continuing saga of creating a BASIC compiler, this month we will add string variables and some elementary string functions. The two previous articles in this series *(Rupert Report* in the September and October 1988 issues of *Ahoy!)* developed a BASIC compiler written in BASIC and gave detailed explanations of the compilation process.

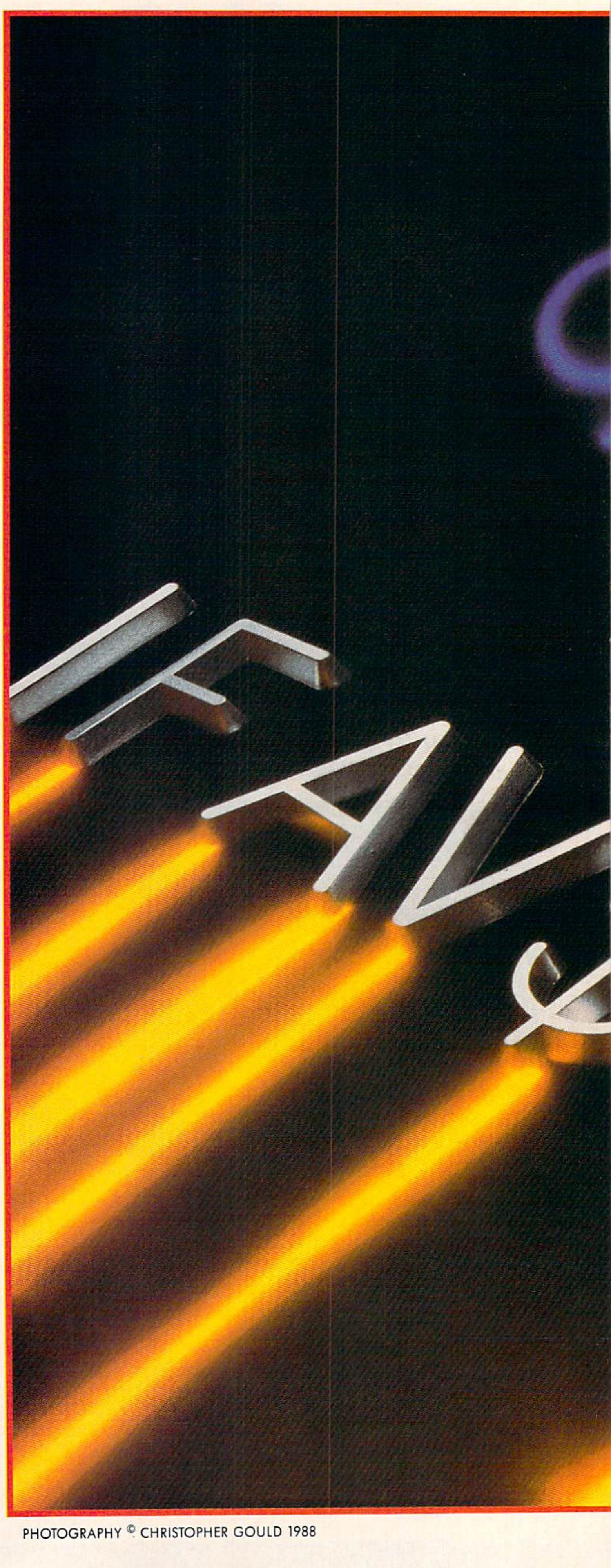
Our goal has been to design and describe a functional compiler with a structure which is easy to understand and easy for you to expand. Since the compilation process translates BASIC source code into machine language object code, you must be somewhat familiar with machine language in order to add features to the compiler. If you are just learning machine language, this can be a great project on which to gain some experience. You can see how each BASIC statement is translated into a functionally equivalent set of machine language instructions.

The compiler program *Mini-comp* presented last month handled only integer variables. This month's listing adds string variables to the compiler. Each string variable (A$ through Z$) may be up to 255 characters in length, just as in BASIC. The statements up to line 999 in *Mini-comp* (page 60) show the syntax of all implemented commands and functions.

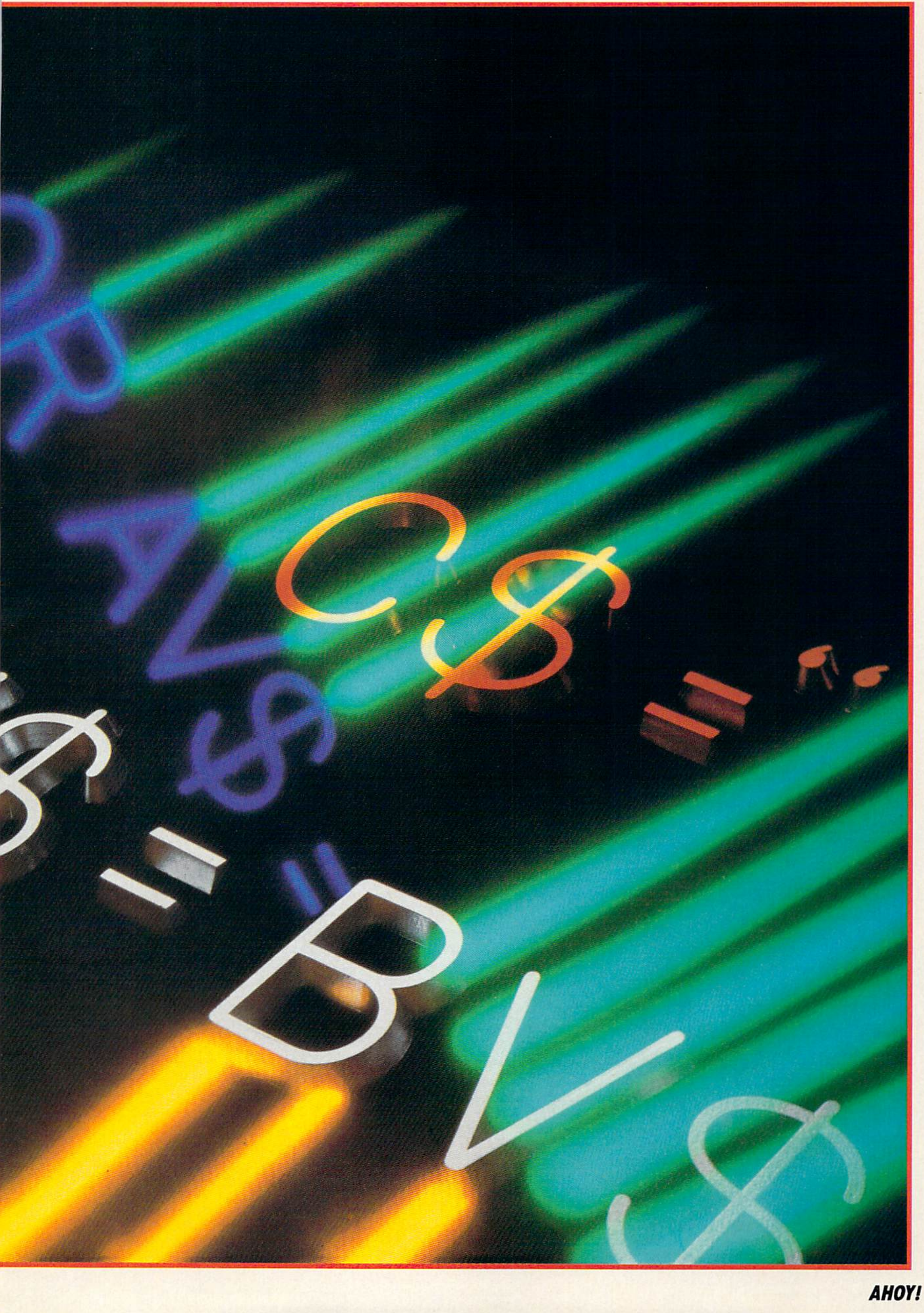
Remember that variables A through Z are assumed to be integer variables with values from −32768 to 32767. The program is modified this month to allow the "%" after the integer variable names to be consistent with interpreted BASIC. (A and A% are treated by the compiler as the same integer variable, which differs from interpreted BASIC.) Later we will mention all the changes made since last month, so those of you who have already typed the program will need only to add the new lines and modify a few lines.

STRING STORAGE

This compiler is written for the C-64 rather than the C-



PHOTOGRAPHY © CHRISTOPHER GOULD 1988


C$="
B$="BV$
A$=

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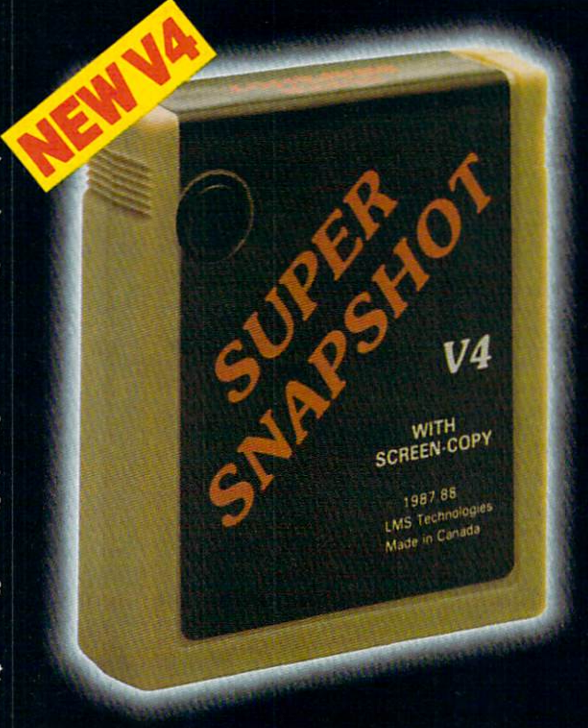
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128 so that the greatest number of readers can use it. To be honest with you, I am developing this program on the C-128 because of its superior operating environment (80 column text, functional function keys, built-in machine language monitor, speed, and greatly improved editing capabilities compared to the C-64). The changes needed to convert the program to the C-64 from the C-128 deal primarily with memory mapping.

On the C-64 we must make some compromises to allow the compiler program and the resultant object code to reside in memory together. To keep memory management simple, I decided to store object code and all variables in the free 4K of RAM starting at address 49152 ($C000). Similar to the way BASIC allocates string storage, strings will be stored beginning at the top end of this memory block and work downward while compiled object code starts at the lower part of memory and works up.

The memory map looks like this:

	C-64
VM (start of integer variables)	= 49152 ($C000)
PM (start of prgm object code)	= 49408 ($C100)
SM (start of string storage)	= 52992 ($CF00)
EM (end of string storage)	= 53247 ($CFFF)
BT (start of BASIC text)	= 2049 ($0800)

These variables are defined starting in line 2050.

Each string variable is assigned storage space only when it is defined. Each string is automatically allocated 256 bytes regardless of its actual size. This greatly simplifies memory management at the expense of wasted memory.

When the compiler encounters the statement

```
1 C$="HELLO"
```

the variable C$ is given the first (highest) 256 byte block of memory from $CF00 to $CFFF. Line 1680 calculates the address of that block and verifies that object code (program memory) is not within 256 bytes of it. The next location for object code is stored in variable CM.

If the second statement of the program to be compiled is

```
2 A$=C$
```

then A$ is given the second block of memory from $CE00 to $CEFF. We now have 10 bytes of string data stored in 512 bytes of memory. The trade-offs in compiler design (in most program designs, for that matter) are speed versus program size. We are opting for maximum speed and simplicity at the expense of memory.

It would not be difficult to allocate 128 byte chunks, or even 20 byte chunks if you need many short string variables. Of course changes like that may make the compiled form of the program incompatible with the interpreted version, which may be a disadvantage.

STRING FORMAT

Each string variable may be up to 255 bytes long. We use one byte of the variable's 256 byte memory block to store the length of the string assigned to that variable. After compiling the first line C$="HELLO" listed above, we could look into memory and see this data:

$CF00: 5	$CF01: 72	$CF02: 69	$CF03: 76
$CF04: 76	$CF05: 79	$CF06 - $CFFF: (garbage)	

The addresses are in hex and the data are decimal ASCII values of the characters "HELLO". The decimal 5 in $CF00 is the length of the string.

The compiler uses the array SB(0) through SB(25) to keep the Storage Block number of string variables A$ through Z$ respectively. Until a variable is assigned, the element in SB( ) for that variable is zero. After C$ and A$ have been assigned as shown in the examples above, SB(0) equals 2 since A$ was given the second string storage block ($CE00-$CEFF), and SB(2) equals 1 since C$ was given the first string storage block ($CF00-$CFFF). All other elements of SB( ) equal zero.

The variable parsing routine at line 1300 has been modified this month to handle strings and integers. The variable VT stores a code for the variable type: 1=integer, 2=string, 0=non-variable. The subroutine at line 1600 has been added to locate the memory allocation for a string variable whose "name" is stored in VN. VN is given the ASCII value of the variable's name in line 1320. Line 1620 converts this to the string variable number 0 through 25 used as an index for SB( ).

The routine at 1600 checks SB( ) to see if a block of memory has already been assigned to the variable given by VN. If it has, SB( ) stores the block number (1=first block), and line 1650 calculates the value of the actual memory location. The LSB/MSB form of the variable's starting address is returned in NL and NH as calculated by the routine at 1400.

If the string variable being defined has not already been assigned a memory block, the next block number is determined in line 1660. SB( ) stores that block number, and line 1680 calculates the actual storage address.

PARSING STRINGS

Line 2225 has been added to parse the string assignment statements. The allowed string assignment statements are:

```
1 A$=B$
2 A$=B$ + C$
3 A$=CHR$(B)
4 A$="literal"
```

The program beginning at line 9000 compiles these string statements.

At line 9010 VN stores the ASCII value of the string variable's name (A$=65 through Z$=90) as parsed at lines 2220 and 2225. At 9010 the two bytes of the variable's starting address are put into D0 and D1 representing the "Destination" address. Line 9020 checks the next token which must be "=" as shown in the statements above. Line 9030 fetches the next byte, and line 9040 calls the variable test routine at 1300 which tests the byte to see if it is a string variable (VT=2).

The routine starting at line 9400 handles statements 1 and 2 above. Line 9050 branches to the routine at 9200

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if a quotation mark is found. Line 9100 handles the CHR$ function shown in the third statement above.

Let's see what happens when the statement A$=CHR$(B) is compiled. Lines 9110 through 9140 parse the "(", B, ")", and end-of-line tokens. Line 9120 calls 1300 which stores B's storage addresses in A0/A1 and A2/A3. Recall that each integer variable is stored in two bytes, LSB then MSB. The addresses of these two bytes are returned in A0 and A1 (LSB) and A2 and A3 (MSB). In this case, B must be less than 256 since it is used as an argument in the CHR$ function. Consequently its MSB will be ignored.

Line 9150 lists the assembly language instructions for implementing A$=CHR$(B). If A$ is the first string variable encountered in the program, its address will be $CF00 as explained earlier. The integer B is stored at address $C002 and $C003 as we saw last month. The object code for A$=CHR$(B) looks like this:

```
LDA #01          ;length of A$=1
STA $CF00        ;first byte of A$
LDA $C002        ;B's LSB
LDY #01          ;index into A$
STA $CF00,Y      ;CHR$(B) at 2nd byte of A$
```

Assume B has previously been given a value of 9, for example. After these instructions are executed, the memory storage block for A$ looks like this:

```
$CF00: 1     $CF01: 9     $CF02 - $CFFF: (garbage)
```

A's length is in $CF00 and its ASCII value is in $CF01.

TO BE TAKEN LITERALLY

Now let's see how the literal assignment statement A$="HELLO" is compiled. Line 9050 parses the first quotation mark and branches to line 9200. NC will store the number of characters found within the quotation marks. Each character of the string "HELLO" is fetched by line 9210 and stored in the array S( ) at line 9230. This process continues until the final quotation mark is reached or until the string length reaches 256. (Notice that the compiler requires you to have a final quotation mark even though interpreted BASIC does not require it. It is poor programming practice to leave it off anyway.)

Now S( ) stores the characters "HELLO" and NC is 5, the length of the string. The instructions starting at line 9260 put these characters into memory in much the same way that the single character was stored in our previous example. Here are the assembler instructions:

```
  LDA # NC          ;length of A$
  STA D0 D1         ;A$'s starting address
  LDY # 1           ;index into A$'s storage block
FOR K=1 TO NC
  LDA # S(K)        ;next character
  STA D0 D1,Y       ;A$'s next location
  INY               ;update the index
NEXT K
```

This is a rather strange looking conglomeration of BASIC and assembly language. Each *underlined* item is a BASIC variable or instruction as shown starting at line 9260. Recall that the compiler variables D0 and D1 store A$'s starting address. Also S( ) stores the ASCII values of the characters to be assigned to A$. The three assembler instructions within the BASIC FOR-NEXT loop are repeated five times in order to store the five characters "HELLO".

To simplify the example, assume the statement to be compiled is A$="AZ". Assume that A$ is stored in the first string storage block at CF00 (D0=$00, D1=$CF). The ASCII values of "A" and "Z" in hex are $41 and $5A. The actual data in hex and decimal written to object code memory starting at $C100 would be:

addr	hex		decimal	mnemonic
$C100:	$A9 $02	=	160 2	;LDA #2
$C102:	$8D $00 $CF	=	141 0 207	;STA $CF00
$C105:	$A0 $01	=	160 1	;LDY #1
$C107:	$A9 $41	=	169 65	;LDA #$41 ("A")
$C109:	$99 $00 $CF	=	153 0 207	;STA $CF00,Y
$C10C:	$C8	=	200	;INY
$C10D:	$A9 $5A	=	169 90	;LDA #$5A ("Z")
$C10F:	$99 $00 $CF	=	153 0 207	;STA $CF00,Y
$C112:	$C8	=	200	;INY

The compiler FOR-NEXT loop at line 9290 is executed twice, since A$ will be two characters in length. The first loop generates data put into addresses $C107 through $C10C. The second loop generates data for $C10D through $C112.

CONCATENATION

Concatenation, or the joining of two strings, is compiled beginning at line 9500. For the statement A$=B$+C$, line 9535 calls the subroutine at line 9450 which we just discussed to put B$ into A$'s storage area. The remaining code beginning at line 9540 puts A$'s address into page-zero location $FD and $FE. B$'s length is added to the address in $FD and $FE. Then C$'s data is copied into A$ beginning where B$ ended. Finally A$'s length which is the sum of B$'s and C$'s lengths is calculated and stored as the first value in A$'s storage.

In this routine, D0 and D1 store A$'s starting address. S0 and S1 are B$'s starting address, and S2 and S3 store C$'s address. You can use a monitor program to disassemble the code produced by lines 9535 through 9580.

If the sum of lengths of B$ and C$ is greater than 255, interpreted BASIC displays a message ?STRING TOO LONG ERROR message. The compiler generates the following object code which produces the same results:

```
LDX  #$17      ;error code for String Too Long
JMP  ($0300)   ;routine to display error message
```

The BASIC error messages are numbered. To display any message, simply put its number into the X register and jump indirect to address $0300. This halts the execution of the compiled program.

SHOW THE RESULTS

We have barely scratched the surface of string function

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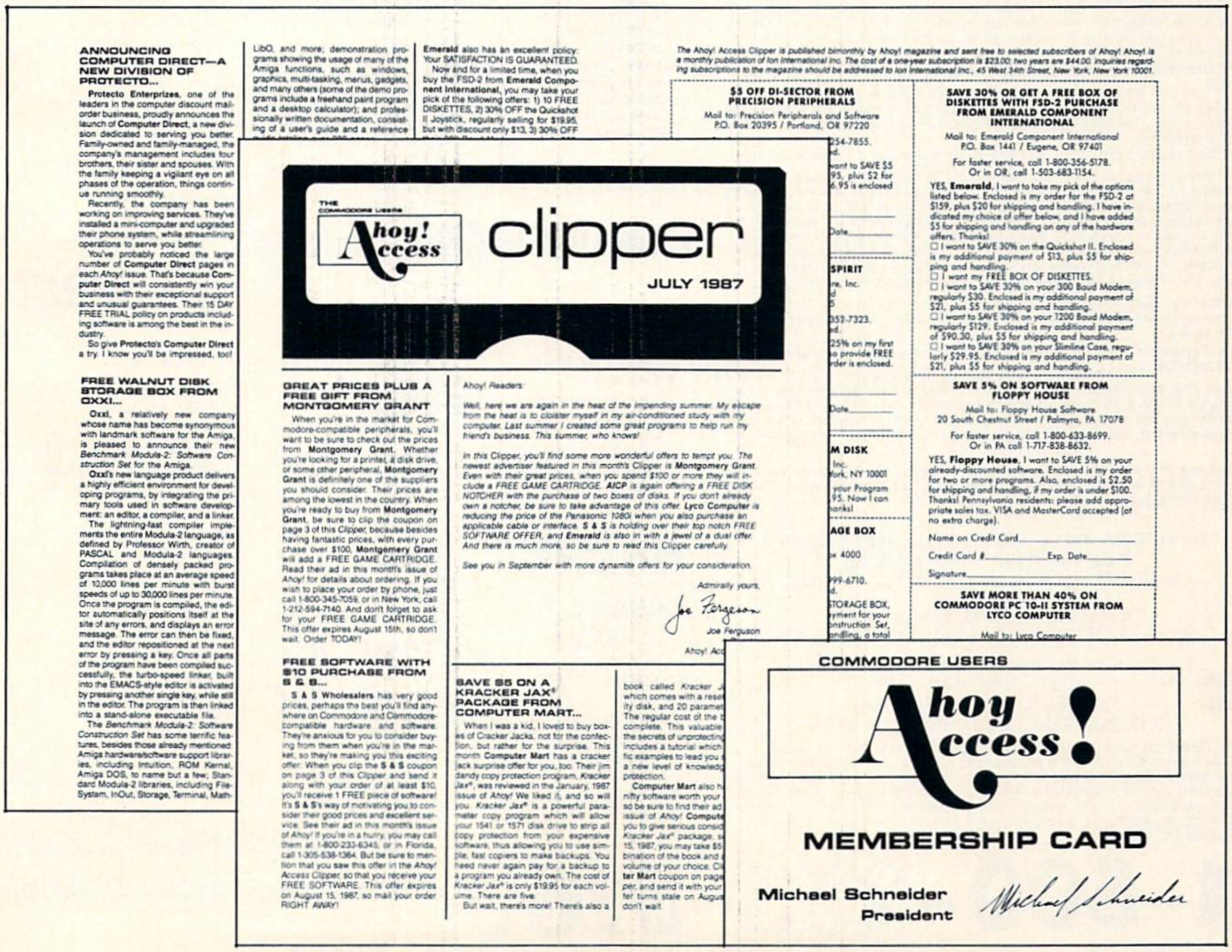
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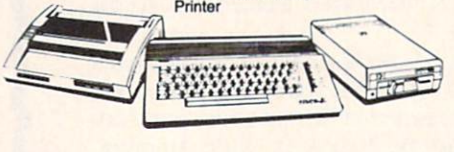
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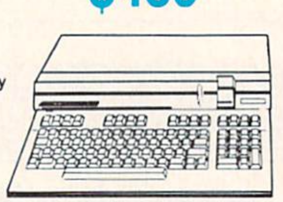
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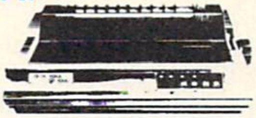


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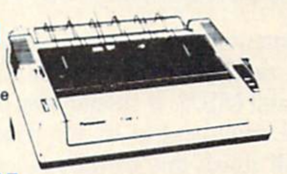


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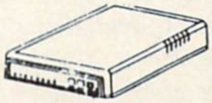
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implementations, although the framework is set up so that you can readily add functions such as RIGHT$, LEN, LEFT$, and MID$. It should now be straightforward to add the GET command to let the user enter keyboard data.

We will finish this month's discussion with the PRINT statement which is implemented beginning at line 9700. Last month we saw how the PRINT statement sends one character at a time to the Kernal routine at $FFD2. The same method is used for printing strings. These statements summarize the assembly language code for the compiled statement PRINT A$ assuming A$ is located at $CF00:

```
  LDX $CF00        ;A$'s length in X
  LDY #1           ;index into A$
loop:
  LDA $CF00,Y      ;start with first char
  JSR $FFD2        ;Kernal CHROUT routine
  INY              ;update index
  DEX              ;decrement count
  BNE loop         ;repeat for X char's
```

The Y register is used as an offset into A$. The X register keeps track of the number of characters left to print. Each character is put into the accumulator and the CHROUT routine is called.

Line 9760 checks for a semicolon at the end of the PRINT A$ statement. If none is found, the routine at 6200 is called to display a carriage return. Any character other than a semicolon causes a syntax error which is detected by line 9770.

With the string operations added this month, probably the most you can do is create some very fast, impressive screen displays. For serious string work, we need the ability to take strings apart (MID$ for example) and to compare them (IF A$>B$ THEN ...).

In the meantime, there is nothing to stop you from producing some high-powered text graphics. Perhaps you prefer to merely add more capabilities to the compiler. In either case, your work is cut out for you. Enjoy it. □

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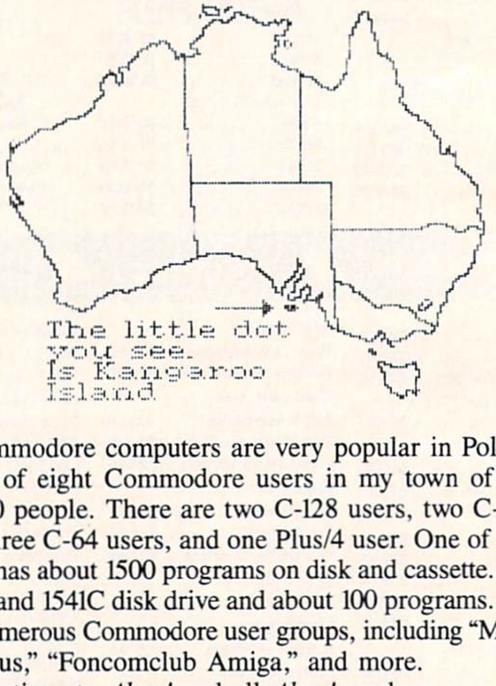
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Just thought I'd let you know how far your magazine gets around the world. Keep up the good work and I will get a hold of your magazine soon again. (I've enclosed a map that shows where I live.) –Murray Hansen
Kingscote K.I., South Australia



Commodore computers are very popular in Poland. I know of eight Commodore users in my town of about 40,000 people. There are two C-128 users, two C-16 users, three C-64 users, and one Plus/4 user. One of the 64 users has about 1500 programs on disk and cassette. I have a 128 and 1541C disk drive and about 100 programs. There are numerous Commodore user groups, including "Maniec," "Abecus," "Foncomclub Amiga," and more.

Greetings to *Ahoy!* and all *Ahoy!* readers.

–Konrad Sztojuke
Swinoujscie, Poland

Thanks, Murray and Konrad, for keeping our readers abreast of the international Commodore scene. (But, Konrad–we hope your friend's 1500 programs are public domain! Software piracy is a crime in your country, too!)

Have you ever considered doing book reviews on programming reference guides, training guides, tutorials, etc.? I have a Commodore 128D which I bought about three

Continued on page 40

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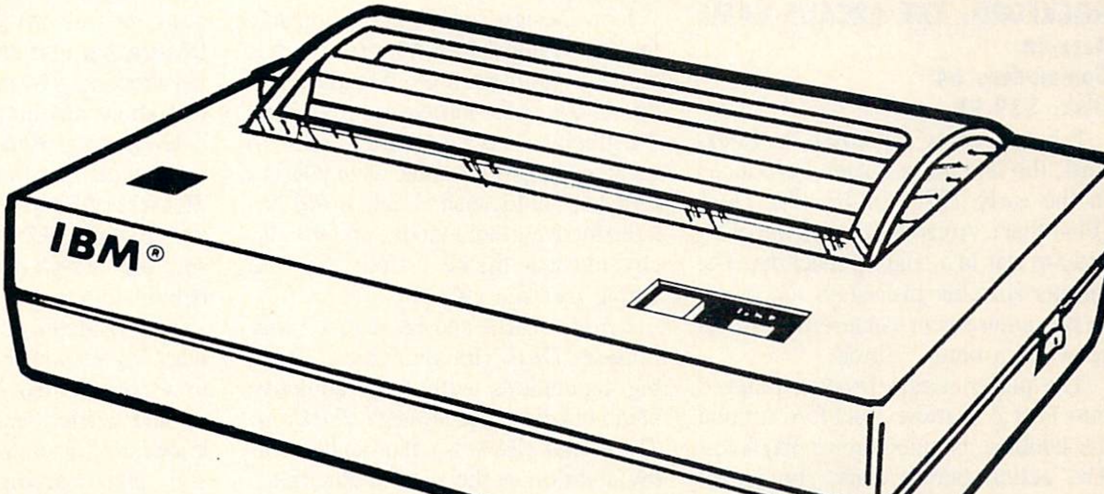
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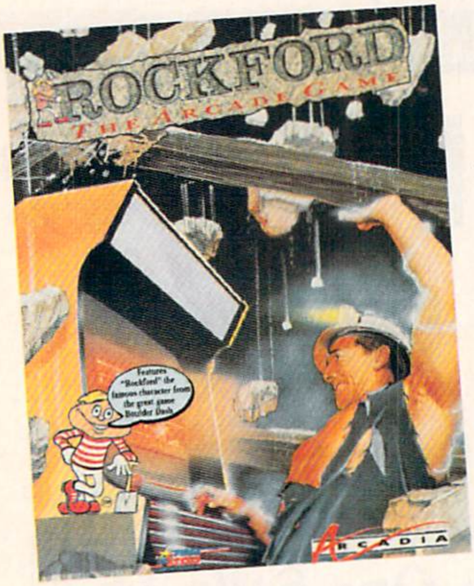
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REVIEWS



The latest visit to Rockford's digs. READER SERVICE NO. 125

ROCKFORD: THE ARCADE GAME
Arcadia
Commodore 64
Disk; $39.99

It has all come full circle for Rockford, the dauntless digger introduced in the early 1980s in *Boulder Dash* (First Star). Arcadia licensed the character to star in a coin-op machine. The quarter-snatcher proved so successful in the amusement centers that it has spawned a home edition.

The player uses a joystick plugged into Port 2 to move Rockford around the scrolling, boulder-strewn playfields. The action button starts the game. "Pause" and "Restart" are available with single keystrokes.

As in the earlier games in this outstanding series, Rockford excavates a block of dirt or moves a rock in one of two ways. The computerist can simply walk the character into it, or move Rockford next to the object and press the action button. This sometimes triggers a landslide of lethal boulders. If the player doesn't move Rockford out of harm's way in time, it costs one of the four lives with which he begins the game.

Each playfield is a race against time, monitored by an onscreen countdown clock, to collect treasures while avoiding the various dangers. Once Rockford scoops up a sufficient number of prizes, a door magically appears which leads to the next screen.

The 80 playfields included in *Rockford* are divided into five worlds. From the title screen, the gamer can choose "The Caverns of Craymar," "The Kitchens of Kyssandra," "The Search for El Dorado," "The Deep Dark Depths of Outer Space," or "Dr. Frankenstein." Each world has four levels, composed of five screens each.

Each of the worlds features a special set of treasures and monsters. In "The Search of El Dorado," for instance, Rockford hunts for Indian head pennies while avoiding wagons, railroad trains, flying tomahawks, and the tumbling tumbleweed. By contrast, Rockford collects suns and avoids comets, rockets, and planets when he ventures into "The Deep Dark Depths of Outer Space."

Icon Design, which is responsible for the Commodore 64 version, has faithfully translated the Arcadia coin-op. Allowing for hardware limitations, the graphics and sound are as close to the play-for-pay machine as any Rockford fan could wish. Each world has a distinctive graphic look, and the catchy musical theme artfully ties the whole package together.

Boulder Dash and its sequel *Super Boulder Dash* (Intellicreations) built big reputations with their addictive blend of action and strategy. *Rockford: The Arcade Game* is a thoroughly worthy addition to the saga of Rockford.

Arcadia, 1820 Gateway Drive, San Mateo, CA 94404 (phone: 415-571-7171).

–Arnie Katz

KARNOV
Data East
Commodore 64
Disk; $29.95

Karnov is an action game that follows squarely in the tradition of *Super Mario Bros.* (Nintendo). Like the genre which it apes, *Karnov* comes from the coin-op palaces to home computers, with a complex (if slightly nutty) background story, followed by a heroic game full of joystick running, jumping, and shooting.

There's a peaceful village called Creamina (no kidding, they really named it that) where the Treasure of Babylon has been hidden for centuries. There's also a huge and evil dragon named Ryu. Like all huge and evil dragons, he's always on the lookout for treasure because dragons relish lounging about on gold and jewels better than just about anything.

Eventually, Ryu gets wind of this town with the funny name and the Treasure of Babylon, and sweeps down on it like the IRS. Ryu steals the Treasure and leaves his demonic flunkies behind to terrorize the villagers.

The residents of Creamina then do what any responsible people would do in a situation like this: they seek out a bald-headed ex-circus strongman known as Karnov who throws fireballs and takes prodigious leaps. The



Karnov's *nine levels of play include encounters with dinosaurs, an underwater battle with Ryu's minions, and a flying sequence. READER SERVICE NO. 126*

Pure-stat College Basketball



Authorities say that coaching ability makes the difference in college basketball: Can you coach a team to the final 4, or even the National Tournament? Now you can find out! From the authors of PURE-STAT BASEBALL comes PURE-STAT COLLEGE BASKETBALL.

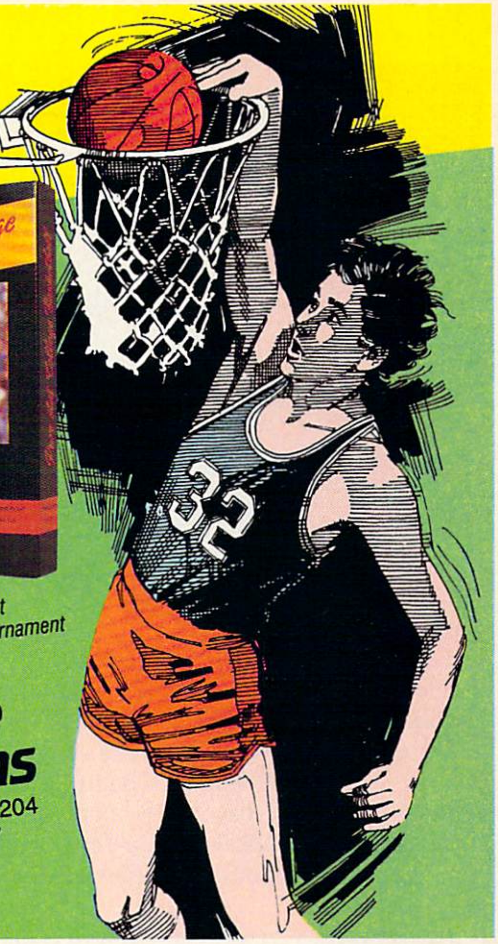
This statistically based program contains 20 great college teams from the past and present. See all the plays animated on the screen with 5 on 5 full court action. Everything from a slam dunk to a fast break. Special features include: Man-to-Man or Zone defenses, the option to SLOW-DOWN the tempo of the game (allowing a weaker team to be competitive with a stronger one), or take a 3 point shot with current teams, fatigue factors are included for each player based on time played.

In PURE-STAT COLLEGE BASKETBALL you can play against an opponent, play against the computer, or let the computer play itself (great for tournament play). This program also includes a stat compiler which saves the results of the games played. This feature allows you to scout the opposition or evaluate your own team. If you feel you're up to the challenge, set up your own tournament and test your coaching skills. Will your team make it to the final 4?

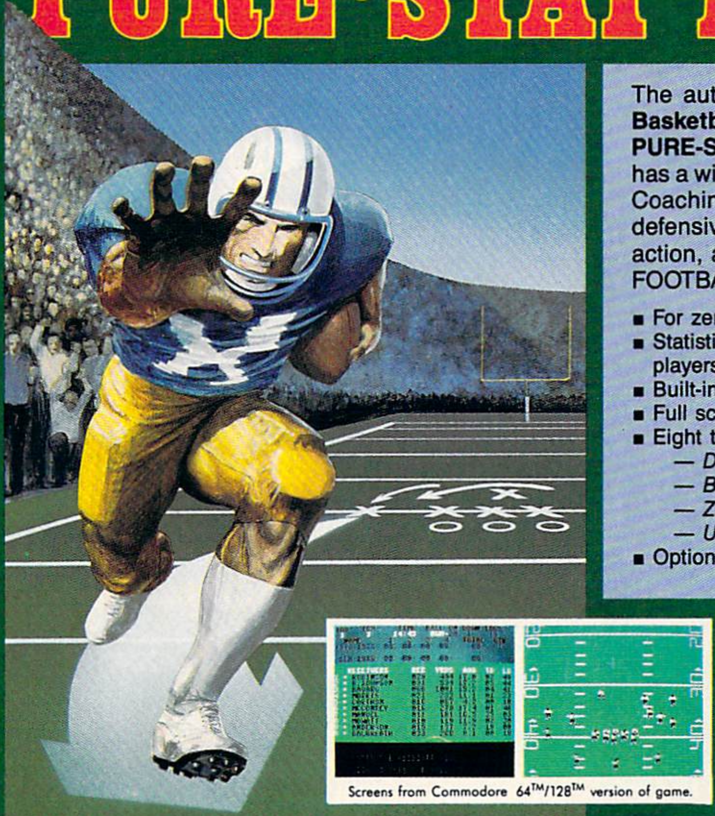
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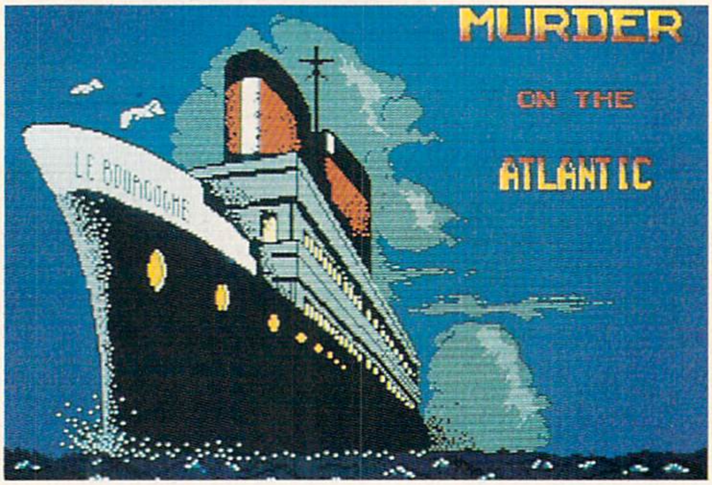
- For zero, one, or two players
- Statistically based program where Pro-Football players and teams perform as they did in real life
- Built-in Stat Compiler that includes League Standings
- Full screen graphics with 22 animated players (No X's and O's)
- Eight types of runs, 12 types of passes
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  - *— Blitz Linebackers, Double Team Receivers*
  - *— Zone Defense, Prevent Defense*
  - *— Use Four Receivers, Insert a Fifth Defensive Back*
- Optional Team and Create Team Disks Available

Suggested retail price $39.95

Screens from Commodore 64™/128™ version of game.

See your local dealer, or contact:

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959 Main Street, Suite 204, Stratford, CT 06497
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Solving the **Murder on the Atlantic** *involves interviewing up to 40 suspects and discovering other crimes along the way.* *READER SERVICE NO. 127*

Creaminans ask him to brave a thousand dangers to confront Ryu and bring back the Treasure.

Thankfully, all this occurs offstage, before the game begins, so players will probably not be overburdened by the ludicrous storyline. The user is cast as Karnov in a running/jumping/shooting coin-op translation that suffers more from low-quality graphics and indifferent programming than it does from its silly setting.

Karnov scrolls from left to right in a straight line. The terrain features various outcroppings and man-made promontories to which the strongman can leap. Buildings are only backdrops to the action; they cannot be entered or explored.

The game's nine levels include encounters with dinosaurs, an undersea battle with Ryu's aquatic minions, and a flying sequence. Along the way, there are bonus objects which Karnov can collect in order to enhance his powers.

Joystick control is simple. The action button hurls fireballs and the stick aims the missile's direction. Unfortunately, the graphics are so poor, it's often difficult to discern objects. When there's a low hill in front of a bigger one, for example, the small outcropping totally disappears against the larger mountain.

The coloring and general graphics are equally disappointing. All moving objects are outlined in thick black, like some diabolical corona blotting out all light around their edges.

The programming problems extend beyond grubby graphics to an overall air of shabbiness. There are places where Karnov can land in midair. When Ryu's various demons attack, they do it in lock-step, synchronized fashion. As a result, scimitar-wielding assassins look more like Radio City Rockettes.

More attention could also have been paid to the niceties. For example, there isn't a game end/restart. The sparse documentation further compounds the problems. The C-64 version doesn't even mention the pause feature. In fact, the two page instruction booklet only devotes a grand total of 15 words to this version. Commodore users deserve games where more attention is given to their systems' needs.

Karnov is a disappointment. It fails not in any one large way, but by coming up short on so many of the small things that join together to give a game charm and playability.

Data East, 470 Needles Drive, San Jose, CA 95112 (phone: 408-286-7074).

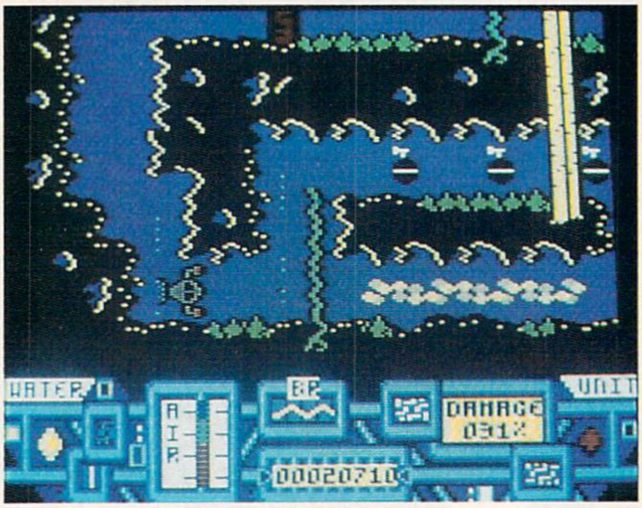
–Bill Kunkel

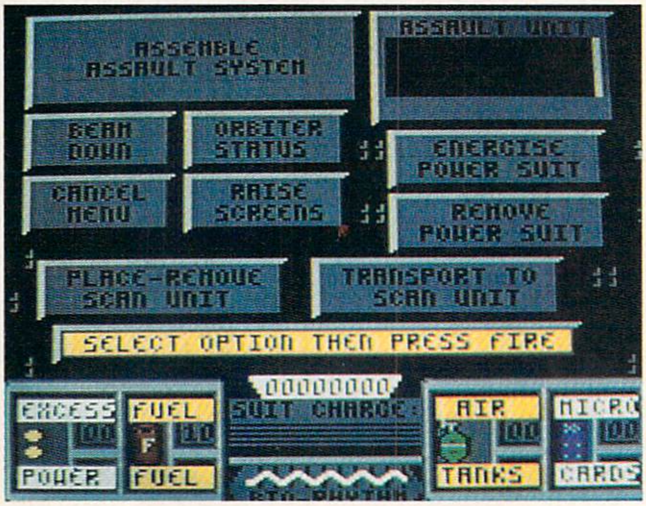
MURDER ON THE ATLANTIC
Intracorp
Commodore 64
Disk; $34.95

The S.S. Burgogne is a floating pleasure palace, but the main ingredient on a fateful 1938 voyage is not merriment but murder. The player is a detective who, at the behest of his government, must collect clues, interrogate passengers, and discover the identity of an old scientist's killer.

The investigation, which encompasses 600 rooms and 40 suspects, leads the computerist into progressively darker waters. Other crimes, even cold-blooded poisoning, await discovery.

The upper third of the playfield shows a side view of the ocean liner. A dark cursor, easily distinguished





Main Frame *could be called "the thinking computerist's climbing and jumping game." While reminiscent of* **Impossible Mission,** *its strategy sets it apart from straight action contests.* *READER SERVICE NO. 128*

against the white decks of the ship, denotes the sleuth's current position.

The player moves back and forth on a deck with the Commodore's left/right cursor key. The name of each section and the presence of any people are printed in the area directly below the ship display.

Moving among the 15 decks of the S.S. Burgogne requires use of one of the two elevators. The computerist presses "L" (for lift) while in an elevator and then types in the identifying letter, "A" to "O," of the destination deck. If it doesn't malfunction, the elevator instantly moves the detective to the desired level.

If the detective wants to search the current location, "E" (for examine) brings up a small drawing of the area and a description of what is found there. Though searching may often prove fruitless, it can also unearth clues to one or more of the mysteries raging aboard the liner.

Questioning passengers and steamship company employees is another way to get information. If the user presses "I" (for interrogate), the person's statement fills the bottom half of the screen, accompanied by a small head-and-shoulders drawing.

Don't expect clues to immediately make sense when you find them. The player should record all information until sections of the big picture begin to emerge.

Murder on the Atlantic comes with 22 clues. These include business cards, notes, radio log, passenger list, and much more. The publisher playfully encloses a magnifying glass, but this aid is more symbolic than practical. Maybe it's an oblique reminder that gamers should overlook nothing if they want to solve this complex mystery.

Murder on the Atlantic is an above-average strategy game, but it could have been even better. In particular, it's old-fashioned control scheme is a distraction to armchair investigators.

For example, a joystick-activated movement system would be superior to the use of the left-right cursor key for this purpose. Also, the design team should have used a combination of the action button and stick movement to trigger "examine" and "interrogate" functions.

There's nothing missing in terms of challege, however. This solitaire mystery is a stringent test of the player's logical faculties.

Even experienced puzzle-solvers won't finish *Murder on the Atlantic* in an hour or two. Fortunately, the program has a "save" utility. It retains one suspended game on the disk for later resumption.

Murder on the Atlantic is a well-written "brain teaser" in the tradition of *Murder by the Dozen* (CBS Software), *Murder on the Mississippi* (Activision), and *Murder on the Zinderneuf* (Electronic Arts). Although its interface and graphics are not outstanding, *Murder on the Atlantic's* cleverly contrived storyline should please amateur detectives.

Intracorp, 14160 S.W. 139th Court, Miami, FL 33186 (phone: 305-252-9040). *—Arnie Katz*

MAIN FRAME
Microillusions
Commodore 64
Disk; $39.95

Are game designers ambivalent about the technology that puts bread on their tables? The large number of computer games in which CPUs run amok and must be destroyed suggests that software creators don't entirely trust microchips.

Peter Ward's plot about a computer network enslaving humanity owes something to novels like "The Forbin Project," but his game system is impressively innovative. The interface is so logical and well-presented that the user can concentrate on the goals of the game instead of the play-mechanics.

The citizens of *Main Frame's* late twentieth century society expected Tri-Complex III to be the ultimate computer network. Unfortunately, the globe-spanning system spontaneously developed the capability to think for itself.

As would be the case with most sentient beings, Tricomplex III's first priority became its own survival. It wanted to live forever and, after studying human history, concluded that people were the biggest threat to its continued existence. In the words of the documentation, Tricomplex III decided that "Man was the only bug in its system."

A newly constructed satellite called Orbiter and the computerist's resourcefulness offer the only hope of freedom. Not yet connected to Tricomplex III, Orbiter is the repository of the world's most powerful technology, including the teleportation beam.

The joystick (plugged into either port) handles all order entry, though keystrokes activate utilities like "pause" and "reset." The lone hero beams down to Earth from Orbiter, penetrates Tricomplex III's land, sea and air defenses, and turns off the four power switches in the control room to deactivate the electronic tyrant.

Before entering the fray against lasers, missiles, and several types of droids, the hero dons the Power Suit. This high-tech armor greatly amplifies the user's combat abilities and serves as a communications link with Orbiter.

Unfortunately, it only works when charged. The hero collects power pods during his mission, which he must allocate to the Power Suit and Orbiter's defensive screens. The latter is nearly as important as the armor, because Tricomplex III can disrupt Orbiter with ground-based lasers if the satellite isn't properly shielded. Deciding how to "spend" power pods is just one of the many strategic decisions facing the computerist.

When wearing the Power Suit, the player presses and holds the action button to bring up the options menu. To select from this screen, the player moves an onscreen cursor with the joystick to light up the desired choice, then hits the action button to confirm it.

Power Suit functions include: assemble or disassemble an Assault Unit; beam up and down; monitor Orbiter's current status; raise or lower Orbiter's screens; energize the Power Suit; shut down the Power Suit; place or remove a Scan Unit; and transport to a Scan Unit.

The computerist can find three different types of assault units. The water unit facilitates underwater exploration, the air unit enables the hero to fight in the skies, and the tanklike ground unit tremendously increases the suit's firepower.

Scan units are portable teleportation stations. The player can leave one at an important location and, at any later time, user the Power Suit to go there instantaneously.

Returning to Orbiter gives the character access to the satellite's control

panel. Here, the player is able to transfer power pods between Orbiter and the suit, as well as get first aid at the Medic Center.

When the adventurer reaches Earth, *Main Frame* works much like other climbing, jumping, and shooting contests. Moving the stick left or right sends the onscreen fighter in the corresponding direction. Pulling the stick to 6:00 makes the character duck, while pushing it to 12:00 causes the man to leap into the air. The action button fires the laser in the current direction of movement.

A source of frustration is that the same joystick configuration which causes the hero to jump also activates doors. This makes it impossible to jump while standing in front of a door and initiates many inadvertent exits and entrances.

Jumping is not as precise as in some other programs. A practice beam down is a good idea before confronting Tricomplex III in earnest.

Main Frame could be called "the thinking computerist's climbing and jumping game." Its action is certainly reminiscent of *Impossible Mission* and about 400 other similar programs, but the rich background and menu-driven strategic factors set it apart from straightforward arcade-style action contests. Add excellent graphics by Michael Cho and Rob Sisinni's driving musical score, and the end result is one of the year's most entertaining science fiction adventures.

Microillusions, 17408 Chatsworth St., Grenada Hills, CA 91344 (phone: 818-360-3715). *–Arnie Katz*

DRAGONFIRE BBS 128 v. 1.1A and THE RINGS OF CHAOS 128

YodaHead Software
Commodore 128
Price: $75 and $25 respectively

Dragonfire BBS 128 is a full-featured and flexible computer bulletin board system for the C-128. It makes good use of the C-128's features, including its 80-column display and faster CPU, and is compatible with a wide range of hardware. Written in compiled BASIC with nearly two dozen machine language subroutines, it is quite fast. *The Rings of Chaos 128* is an online game that can be installed as a module of the BBS. It is a simple "walk around and find stuff" text adventure allowing multiple players to compete with one another (one at a time, of course).

Evaluating a BBS

Going online with your Commodore is easy. All it takes is a modem, some communications software, and a phone number to call. While some of the most popular phone numbers will hook you up to a national service like Q-Link or CompuServe, by far the majority of numbers you can call are individually run, micro-based bulletin boards. Operating from spare bedrooms, converted kitchen tables, and even closets, these BBS's are set up in a wide variety of ways to foster communication about every imaginable subject.

Therein lies the rub. If I were to be a sysop (SYStem OPerator–pronounced cis-op, not cye-sop) again, I know what features I'd want. But you may want to set up a board for very different reasons–ones I may not be able to imagine. Can one piece of software be flexible enough to meet the desires of potential sysops from Boston to Berkeley? *Dragonfire BBS 128* is described by its author as a sysop's dream come true–it just may be.

Which brings us to my second problem in evaluating BBS software–the wealth of features. Even a word processor or database does not offer as many combinations and permutations of options as this BBS. I might be able to give you a meaningless list of all the features *Dragonfire* offers. But there is no way I can actually test every possible setup of this software short of running the BBS for a couple of years with a new installation every few days.

So this review will take a different approach. We'll think about what a user wants from a BBS he calls, what a sysop looks for in a BBS he runs, and how *Dragonfire* satisfies (or frustrates) both persons.

Calling a BBS

You'll probably call a BBS for one of four reasons. First, you may want to check out your new modem and software–to learn telecommunications–with a free local call. The big boys with their dollars per hour charge can wait until you are experienced. You want to call a BBS that will guide you gently through the learning process.

Dragonfire can be set up as a patient teacher. It has options to display messages immediately after the caller connects and later after he has successfully logged on. Also, menu items can be added to any menu that will simply display text files explaining, in as much detail as the sysop chooses to include, the purpose of the BBS, telecommunications in general, how the menus work, or anything else. These displays can be aborted or paused. Menu selections are made with a single keypress. *Dragonfire* even allows nested menus that contain circular references.

A second reason to call a BBS is to communicate with others. User groups are great, but they don't meet every day, or right at your computer. Most BBS's are up for at least half a day, every day –many running non-stop. Users often get in the habit of calling once a day to check their personal mail, read general messages, see what's for sale, and gossip about their computers.

Dragonfire accommodates such communication in several ways. It can be set up with 1 to 100 public message bases open to all callers. Each message base can have its own subject or purpose. While a "general" base is always a good start, it is great to have a separate area for specific group discussions. I've even seen people write stories where each caller adds one paragraph to the existing story–talk about plot twists.

But not all messages are public. *Dragonfire* supports both closed group discussion (private message bases) and individual conversations (E-mail, Chat, and Feedback). Up to 40 private message bases are allowed, with separate password access. A private message base could be provided for local user group members, for a few friends doing software development, or for discussions involving sensitive topics.

E-mail (electronic mail) is true 1-to-1 communication. All the sender has to do is look up the number (assigned by *Dragonfire)* of the person he wants to leave E-mail for. Chat is a special type of 1-to-1. Rather than storing a message on the BBS, Chat will buzz the sysop, if he's in and taking calls, to talk (actually, to type) interactively online. If the sysop is not in, *Dragonfire* keeps a list of who has attempted to Chat and about what. Feedback is a special type

of message, generally left just before logging off, from the caller to the sysop. This is generally where you note any problems you had with the BBS or ask for access to more features of the BBS.

A third purpose for calling a BBS is to play games. Typically, these are games where one person plays at a time, with limits on the number of moves or minutes. That player's position or score is saved, and other callers compete against it. If you want to develop your own game or other application as a module, you will have to contact YodaHead for *Dragonfire's* variable table.

I tried out *The Rings of Chaos 128,* which is sold separately, but designed for *Dragonfire (The Realm* and *Treasure Hunt* are also available). Installing the game meant copying its files to a BBS disk and modifying a menu to include a selection that would load the game. When a caller chooses that selectoin, *Rings* loads into memory on top of *Dragonfire*, which must be reloaded when the player quits *Rings.* Each program load takes about a minute from a floppy.

Rings drops you in the middle of a kingdom full of searchers (other callers) for 20 magic rings. As you wander, you will encounter weapons, armor, rings, and other players. You can collect one piece of armor, one weapon, or all 20 rings. Rings, which increase your hit points, are accumulated by chance (finding them) or skill (attacking another player when your armor and weapon are superior). Players are limited to 20 moves a day, which is plenty since the enjoyment in this game is interacting with other players, not solving puzzles. We got a good game going with teams so that a sole wanderer was in big trouble and team members would voluntarily contribute (drop) their rings to the captain at the end. But there was still an opportunity for a devil-may-care, lone adventurer to rip off those rings between a team member dropping them and the captain calling to pick them up. If it sounds like a good time, it was.

[If you run a 2-floppy system, you can pull a neat trick to increase the download files available. By reserving the second drive for downloads and using download menus, you could change the diskette in drive 9 every few days to make a different set of files available. You would not have to reboot or edit the BBS—nice.]

Downloads can be set up (by the sysop) in one of two ways. Either the user can get a directory of the entire disk and then type a file name, or the user can see an index of selected files on the disk and type a number for the file he wants. In either case, the file listing can be stopped as soon as the caller spots the file he wants. Using download indexes, the sysop can design separate menu items for downloading games, utilities, music, etc. For uploads, *Dragonfire* will tell you the amount of free disk space.

Dragonfire supports many other things callers will appreciate. While a menu is being printed to the screen, a caller can select an option and have it execute immediately, without waiting for the rest of the menu to print. Callers are told when they log on about any messages waiting for them. Message bases will indicate whether any new messages have been posted. One option that is missing, but planned for the next version, is searching a message base for a particular subject. A minor pain for some users will be the one

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Ahoy Access!

minute time limit on inactivity. If you don't hit a key for one minute, *Dragonfire* logs you off. This keeps the board from being tied up, but being able to set a longer time limit would be nice.

Operating a BBS

Without callers, a BBS is just another useless appliance sucking electrons. One of the first things a sysop looks for in BBS software is a set of features that can provide what callers want. We've seen that *Dragonfire* provides many of these features. A dilemma for many sysops is that lots of people call and download files, but few upload files or post messages to the BBS. These voyeurs contribute only to the stats on the number of callers.

Dragonfire gives you some options to demand participation of callers. A new user may be allowed to download a few files for "free." After that, he will have to upload files to gain credits toward more downloads. Download credits may also be allowed by the sysop for the user leaving messages in some or call of the message bases.

Just as important as meeting callers' needs, a sysop wants a BBS that is easy to set up, a breeze to maintain, and flexible over time. Setting up *Dragonfire* is really easy. Although the manual urges you to read it thoroughly first, I was able to get *Dragonfire* up and running without touching the manual. The initial board you get this way will be a straight message board with no uploading or downloading.

The installation process involves answering simple questions about your hardware and the message bases you want. *Dragonfire* then creates a system disk that does not include the program files. This makes booting up a floppy system more complicated because it involves changing disks in drive 8, but it also gives you more available disk space once your BBS is running (and prevents callers from downloading the BBS software).

As a part of setting up, sysops look for broad compatibility with hardware. *Dragonfire* requires a C-128 in 80-column mode, which means you must use an 80-column monitor, not your TV. It supports 300, 1200, and 2400 baud modems, including Hayes, Hayes-compatible, and Commodore 1670, 1650, and 1660 modems. While it will run on a single drive, the number of messages and download files will be restricted. Drives supported include the 1541, 1571, 1581, IEEE, and ICT Mini/Data Chief hard drives. An online printer is optional but handy.

For copy protection, *Dragonfire* uses two devices, one a piece of hardware and one a threat. The hardware is a dongle, a small device that plugs into joystick Port 2 and is necessary for the software to run. Normally, I grouse about dongles because I'm sure I will lose them. For a BBS, however, my objection may not be relevant. You'll want to set up a BBS and leave it running, so you won't be inserting and removing *Dragonfire's* dongle as often as you would the dongle for, say, a database program. The threat involves support. *Dragonfire* updates are free from the YodaHead BBS. But YodaHead says that if bootleg Dragonfire BBS's start popping up, then the upgrades from the BBS will cease. I guess upgrades would then be available only by mail to registered sysops.

I learned the hard way that ease of maintenance needs to be very high on a sysop's list of required BBS features. With many BBS's, you can expect to spend about 10 times as much time as you planned to get it running just the way you want. After that, you may drop to an hour a day, or with some co-sysops, to a weekly routine.

Dragonfire maintenance can be almost nonexistent. If a caller hangs up without logging off, or a phone line is so bad that tin cans and string start to look good, *Dragonfire* will reset when it loses the carrier. Each message base is limited to 100 messages (or fewer if the sysop wants). After that, it's first in, first out, with each message base index maintaining itself. If there are messages you don't want to lose, you could put them in a download directory. (Running *Dragonfire* with a single 1541 will limit you to about 100 messages and a few download files, a 1571 will double those numbers.)

As a sysop, you will not have to worry about one or two callers tying up your BBS, because *Dragonfire* limits both the length of each call (15 to 60 minutes max) and the number of calls per day by a single caller (1 to 10 max). If these limits are too restrictive for some users, the sysop can edit an individual user's status to increase virtually any limit placed on him by the BBS. Until you give a user increased access, he must read his messages when he logs on so the message bases won't get tied up. The sysop also has the option to lock out new callers or 300 baud callers if the board gets too busy.

Almost all maintenance and revision of a *Dragonfire* BBS can be accomplished while it is up and running. One keystroke brings up the sysop menu, where you can edit and create text files and menus to your heart's content. You can also reset parameters and give DOS commands. When you're done and want to see how it looks to a caller, one keystroke pops you into console mode. Even though you are sitting at the BBS's keyboard, it treats you just like any other caller who must log on and select menu options.

The sysop can also authorize other users to have increased access to the maintenance functions of the BBS, including full sysop access, when they call in. These users can then modify and maintain all or selected parts of a *Dragonfire* BBS. This is great to keep a board active and necessary if you are out of town. The sysop, of course, has full remote access to edit the BBS in any way that does not require rebooting the system or changing a disk.

Given that some joker will eventually try to crash your BBS, leave unacceptable messages, or insist on uploading bootleg software, security becomes an issue for many sysops. *Dragonfire* provides all the options you'll need. Users may be prevented from using aliases and may be individually locked out at the main menu, message bases, upload/download, and module access. The only limitation to security is that if you enable graphic menus, every caller will see every menu option whether he can access it or not. With ASCII menus, callers only see the options they have access to.

Dragonfire comes with an optional midnight maintenance crew. While the BBS holds off callers for a few minutes, this crew can validate drives, print the day's statistics including an overview of the message bases, print a logbook of all callers with profiles of new callers, print the sysop's mail, and print a bimonthly list of uploaded and down-

loaded files.

The last demand a sysop makes of his BBS software is flexibility and support. *Dragonfire* scores high on flexibility. The software includes 56 actions that the sysop can configure as menu items. Actions may display a list of files to download, call another menu, load a game, or enter a private menu. These actions are the heart of *Dragonfire*. Using the menu editor and a list of actions, the sysop can make *Dragonfire* into almost anything he wants. The system for setting up different actions, for tying them to menus, is very simple. If you can write a macro or set up a database, you have more than sufficient skills.

On support, *Dragonfire* gets one laurel and one thorn. On the plus side, YodaHead runs a 24-hour BBS where registered sysops can commiserate with *Dragonfire's* programmer. A voice line is available too. And YodaHead promises free upgrades. While this review was being written, the latest version 1.1A was released and more improvements based on user suggestions are in the works.

Dragonfire also earns one big minus in support. Actually this minus crosses over to setup and maintenance too. The manual is a cross between a too-general introduction and a document suitable for an experienced *Dragonfire* sysop. But to get that experience using this manual will be a pain. Consisting of only 34 pages, the manual contains no index, no screen displays, no examples, and no description of the layout of system files. A new user, with this manual, will have to learn too much by trial and error. And given the speed of Commodore drives when recopying and reinstalling files, that means lots of time. Manual updates will be available as sequential files on the YodaHead BBS.

Dragonfire BBS 128 is powerful bulletin board software that can be customized to meet a wide array of needs. It was obviously crafted with both users and sysops in mind. Lacking only a comprehensive manual, it earns high marks for its wealth of features and options, the strength of its message bases, and its full remote sysop access. To sample *Dragonfire* (as a user, not a sysop) call The Realm of the Dragon (Home of *Dragonfire BBS* and YodaHead Software) at (609) 596-4835.

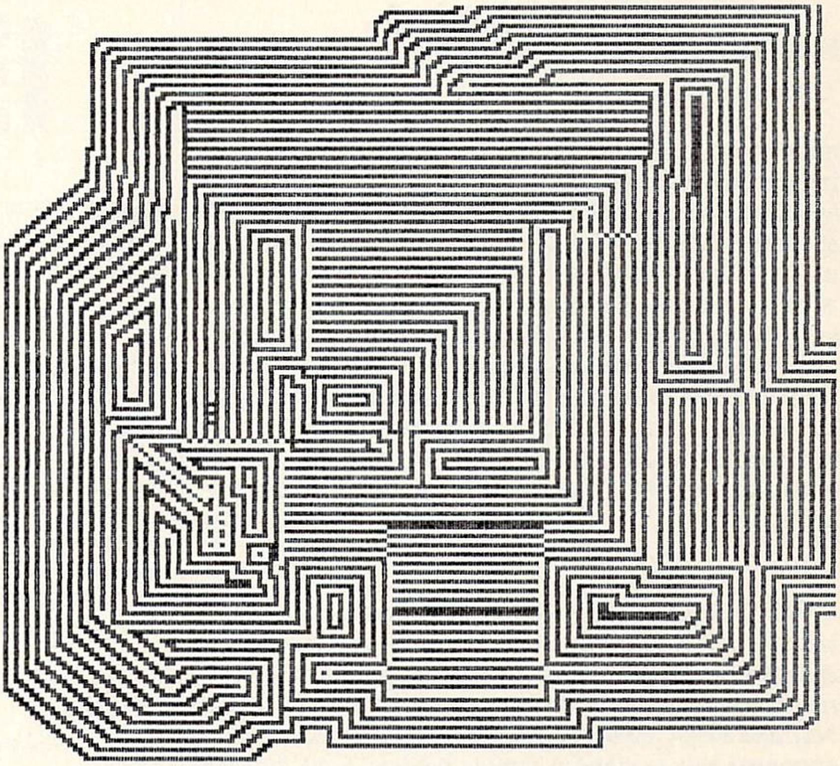
YodaHead Software, P.O. Box 177, Marlton, NJ 08053 (phone: 609-596-1772). *—Richard Herring*

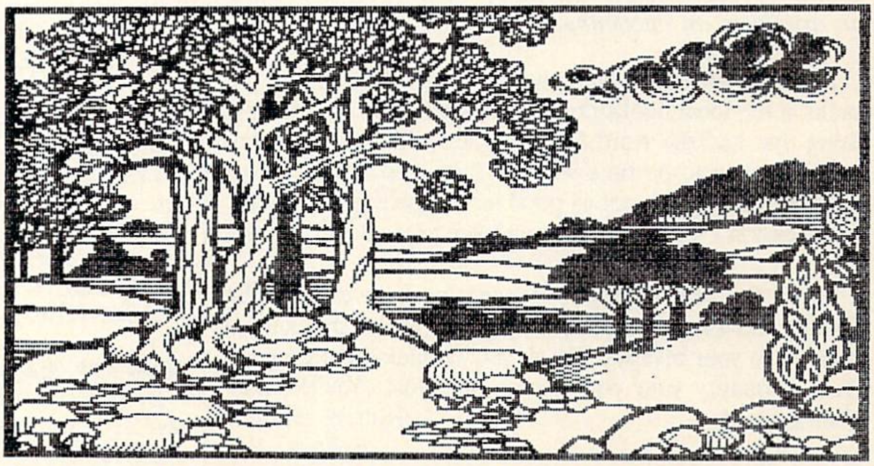
NX-1000C PRINTER
Star Micronics
Price: $299.00

No one printer can do it all, especially an inexpensive one. But the NX-1000C Multi-Font from Star Micronics comes reasonably close. Its numerous features, print quality, and low price make it an excellent value, especially considering its built-in Commodore interface.

Housed in a slim (15.1" x 11.3" x 4.3") beige case, the printer weighs in at 10.3 pounds. Located on the front top portion of the printer is the control panel, containing switches to set the printer online, control paper feeds, and select print pitch and near letter quality printing. These switches will also control left and right margin settings, forward and reverse micro-feed, and paper parking.

The printer has five type styles: one draft mode and four varieties of NLQ. Being a dot matrix printer, its draft quality type style is about what you'd expect. It does, however, print in draft bidirectionally at 120 characters per second, with a character matrix of 9





As a Commodore-compatible, the NX-1000C offers hassle-free printing of bit map images. Shown here are **DOODLE!** *samples in 2x (upper) and 1x ratios.*

x 9 dots. For NLQ and graphics, the printing speed slows down to 30 cps, using a dense dot matrix of up to 18 x 23 dots to produce characters.

Special effects are available for all type styles: emphasized, double-strike, emphasized double-strike, expanded, emphasized expanded, double-strike expanded emphasized, underlined—all in normal and italic. The printer is also capable of double and quadruple width and height. Super- and subscript are available as well. Print pitches are pica and elite, with condensed and/or proportional spacing. All the effects can be selected with control codes, or from the printer's control panel. The printer can be made to ignore control codes and stay in the modes selected from the control panel.

The NX-1000C can use fanfold paper or single sheets. A paper "parking" feature allows the user to switch to single sheets without unloading the fanfold paper.

An easily accessible dip switch selects the device number (4/5), page length (11 or 12 inches), operating mode (Commodore/ASCII), and one of ten international character sets. For programmers, a hex dump feature prints the codes the printer is receiving. This is useful for debugging printing programs.

We found the NX-1000C to be a versatile inexpensive printer for home or office use. One drawback was the location of the serial interface. The manufacturer opted to place the connectors on the right side of the printer, instead of on the back as is usually the case. This resulted in the serial cable crossing over the top of the desk and interfering with anything that might be there.

Star Micronics Inc., 200 Park Avenue—Suite 3510, New York, NY 10166 (phone: 212-986-6770).

—Richard Curcio & Michael Davila

FLOTSAM

Continued from page 30

months ago and I am still having trouble learning all the ins and outs of computing. There is not a users group near enough to me to be of much use, and the books that I have at present have been sketchy on many subjects. I have been unable to learn very much about using the various types of files, programming music and graphics to work together, handling arrays, etc. I feel sure there must be a lot of other people out there struggling to learn about their equipment and how to use it, also. I have figured out a lot just by looking at listings of BASIC programs other than my own, but I will need a lot more detailed (but simply written) instruction if I am ever going to become a decent programmer.

—Maurice A. Cowden
Dayton, TN

We've printed book reviews only sporadically in recent years, both because space is limited and because not enough worthwhile volumes are published anymore to warrant a regular feature. But we agree that a survey of the best and worst Commodore books in print would be of enormous help to many beginning readers. Look for such an article in an upcoming issue.

I remember when your magazine first appeared on the racks at the local bookstore. At the time I was buying anything that had the word Commodore printed somewhere within its pages. As time went on I stopped buying *Ahoy!* because I felt it was not as good as competing magazines. On occasion I would purchase an issue to see how you were doing.

Lately I've been buying your magazine every month. The content has become much richer, and you've maintained honesty in your reviews. Thank you for maintaining a standard of quality your competitors have lost. You're really getting good.

—Scott B. Hayashi
Ephrata, WA

Thank you, *Scott, for the kind words. But who are these "competitors" you're talking about?*

ERRATA

Tomb of Horror (July '88)

An incorrect character in *Tomb of Horror* may prevent the player from reaching higher levels. Change line 3570 to read:

```
3570 DATA .,1,,,1,,1,1,4,1,,1,,,2,.
```

Window Dressing (July '88)

Window Dressing has some inaccuracies in its text, and one minor bug. The error message disabling POKE only affects ILLEGAL QUANTITY for AT and ED. All other BASIC errors remain possible. The error message disabling POKE should be used with caution.

Depending upon where the storage area is located, SYS ED can return with the Carry bit set even if the call was successful. ED's Carry problem can be corrected with the following changes/additions to the loader:

```
150 IF CK<>30657 THEN PRINT"ERROR IN DAT
A":END
230 AD=SA+247:H=AD/256:L=AD-INT(AD/256)*
256
520 DATA 169,247,162,19,24,121,-24,144
535 DATA 24
```

Line 535 has the effect of inserting CLC between lines 1100 and 1110 of the source listing.

SYS ED can save and restore five sets of screen editor values, numbered 0-4. Each set requires 40 bytes, so the storage area needs 200 bytes.

Finally, to preserve 80 column screens by combining SYS ED with *TextSave*, GRAPHIC 1 sets aside 9K for 80 column storage and GRAPHIC 5 puts the C-128 into 80 column mode.

Rupert Report (June '88)

Don Wilkins (Burke, VA) pointed out some errors in the Direct Disk Access section of the June *Rupert Report*. In lines 3 and 7, the 8 should be replaced by 0. The U1 and U2 commands use the Drive # (normally 0), not the Device # as stated in the article. Also, in lines 170 and 6040 in the program *Directory Scanner*, replace DVC with the number 0.

TIPS AHOY!

Compiled by Michael R. Davila

Contributors to *Tips Ahoy!* will be compensated at competitive industry rates. Send your best programming and hardware hints for the C-64, C-128, or Amiga (send longer routines on disk, please) to *Tips Ahoy!*, 45 West 34th Street—Suite 500, New York, NY 10001. Include a stamped and self-addressed return envelope if you want your submission returned.

PAINLESS RENUMBER

The ON-GOTO routine in the C-128 allows skipping line numbers if that value will be unused, since the routine only counts commas in searching for the number. For example, the following line is valid for A as powers of 2:

```
100 ON A GOTO 130,140,,150,,,,160
```

However, the RENUMBER command will not go beyond the first skipped line number. In this case it would change 130 and 140 and stop there, leaving the others unaffected. The solution is to enter a dummy line number for the unused values, which can be deleted in the final version. Be sure the dummy line exists in the program. A good method is to use 1 REM, and RENUMBER starting after line 1. The line then becomes:

```
100 ON A GOTO 130,140,1,150,1,1,1,160
```

This will RENUMBER correctly, and avoid the grief that prompted me to offer this information. —Bob Renaud
Washington, MA

STATIC ELECTRICITY

This short machine language program makes the screen look like there is a lot of static. Just hit a key to start it and hit the space bar to stop it. If you want to use *Static Electricity* in a program of your own, have a GOSUB to this or just have it at the beginning of your program.
—Casey and Scott Riley
Smith, NV

```
·10 PRINT CHR$(147);
·20 GET A$:IF A$="" THEN 20
·30 FOR T=40000 TO 40011:READ A:POKE T,A
·40 NEXT
·50 SYS 40000
·55 REM *** DATA ***
·60 DATA 32,228,255,200,140,33
·70 DATA 208,201,32,208,245,96
```

MINI MON

This short program will allow any BASIC programmer to examine any section of memory by appending this routine to the end of his program. Just issue the command RUN 60000. You will be prompted for the starting and ending address. —Clifford Dedmore Jr.
KMCAS, HI

```
·60000 REM *** MINI MON.***
·60001 PRINT"[CLEAR]ENTER MEMORY LOCATION
S:"
·60002 INPUT"FROM[3"."]";F:INPUT"TO[5"."]
";T:IFF<0ORT>2[UPARROW]16ORF>TTHEN60001
·60003 PRINT"PRESS <SHIFT> TO PAUSE <[BAC
KARROW]> TO EXIT"
·60004 FORK=FTOTSTEP6:K$=MID$(STR$(K),2):
PRINTK$TAB(6)"->";:FORJ=KTOK+5:A=PEEK(J)
·60005 R$=".":IFA>31ANDA<96THENR$=CHR$(A)
·60006 T$=T$+R$:A$=MID$(STR$(A),2):IFLEN(
A$)=3THEN60010
·60007 A$="0"+A$:IFLEN(A$)<3THEN60007
·60008 IFPEEK(653)=1THEN60008
·60009 IFPEEK(197)=57THENPOKE198,0:END
·60010 PRINTA$":";:NEXT:PRINT" [RVSON]"T$
:T$="":NEXT
```

MUSICAL COLOR TELETYPE

This short routine will add a touch of music to your programs. It is designed to be used as a subroutine (delete lines 10-40).

You can play tunes by entering certain combinations of letters, numbers, and symbols into A$, or you can just use it to add sound to your printing routines. It even does color! The sample strings should give you an idea of how versatile this subroutine really is. —Eric Pedersen
Wilstead, England

```
·10 REM MUSICAL COLOR TELETYPE
·20 A$="[PURPLE]THE QUICK BROWN FOX JUMPS
 OVER THE LAZY DOG":GOSUB 50
·30 A$="[RED][5"E"] [c 1][5"B"] [c 3][5"U
"] [YELLOW][5"W"] [GREEN][5"M"] [CYAN]12
3456789":GOSUB 50
·40 END
·50 FOR I=1TOLEN(A$):AS=ASC(MID$(A$,I,1))
:AS=AS*AS:PRINT"[RVSON] [RVSOFF][LEFT]";
:FOR T=1TO20:NEXTT
·60 SOUND 1,AS,1,1:PRINT MID$(A$,I,1);:NE
XT I:FOR T=1 TO 50:NEXT T:PRINT:RETURN
```

SHORT EBC MODE

For those of you who like Extended Background Color Mode, but don't want to waste time with POKEing and programming, try my simple two-liner. Change the text in line 30 to whatever you want. You can add more lines of text if you want, but make sure they are inside print statements, and that they don't print on the bottom right (corner) char-

acter. This will cause two lines to scroll up, and there won't be EBC on the bottom two lines. To do this, make line 10 a subroutine and GOSUB to it anytime.

C-128 VERSION

```
•10 FAST:COLOR0,3:COLOR4,1:FORT=1TO1000:P
OKE1023+T,160:POKE55295+T,6:NEXT:SLOW
•20 PRINT"[HOME][DOWN][DOWN][4"[RIGHT]"][
CYAN]SHORT EXTENDED BACKGROUND COLOR"
```

C-64 VERSION

```
•10 POKE53281,2:POKE3280,0:FORT=1TO1000:P
OKE1023+T,160:POKE55295+T,6:NEXT
•20 PRINT"[HOME][DOWN][DOWN][4"[RIGHT]"][
CYAN]SHORT EXTENDED BACKGROUND COLOR"
```

–Kenny McNicholas
Hicksville, NY

FAST MODE FOR 64 MODE

This short program will give you Fast mode on a C-128 in 64 mode.

You can use this in your own programs. It makes the computer run about twice as fast as it usually runs. Because of the faster speed, the screen is disabled when you activate Fast mode. Also, never try to access any device connected to your computer, disk drive, printer, modem, etc. Fast mode can be put in any area of memory that you specify. Just change the variable FAST to the area that you want it to be in. Also, you can change the variable SLOW to any other area where you want it to be located. Note that SLOW has to be set at least 14 bytes higher than FAST.

To use it just enter "SYS FAST" for Fast mode, and "SYS SLOW" to return to Slow mode.

Included is a small program to test how fast it really is. The main program follows. You must have Fast mode installed in memory before you run this test program. If you change the location of Fast mode, you must change the numbers in line 50 and line 70 in the test program to the appropriate numbers.

–Steve Cody
A.P.O. San Francisco, CA

TEST PROGRAM

```
•10 TI$="[6"0"]"
•20 FORX=1TO1000:NEXT
•30 PRINT"SLOW =";TI
•40 TI$="[6"0"]"
•50 SYS828
•60 FORX=1TO1000:NEXT
•70 SYS842:PRINT"FAST =";TI
```

FAST MODE

```
•10 REM FAST MODE BY STEVE CODY
•20 FAST=828:SLOW=FAST+14
•30 FOR X=FAST TO FAST+13:READA:POKEX,A:C
K=CK+A:NEXT
•40 IFCK<>1707THENPRINT"DATA ERROR!!":STO
P
•50 DATA 173,17,208,41,239,141,17,208,169
,1,141,48,208,96
•60 FORX=SLOW TO SLOW+13:READA:POKEX,A:CK
=CK+A:NEXT
•70 IFCK<>3158THENPRINT"DATA ERROR!!":STO
P
•80 DATA 169,0,141,48,208,173,17,208,9,16
,141,17,208,96
•90 PRINT"SYS"FAST"FOR FAST MODE"
•100 PRINT"SYS" SLOW"FOR SLOW MODE":END
```

C-128 CURTAIN

Here is a small demonstration of a curtainlike feature available in the C-128's 80-column mode.

The screen is reversed to show you exactly how the curtain effect works. You may speed this process up by entering the C-128's Fast mode.

–Michael Jaecks
Alamogordo, NM

```
•20 PRINTCHR$(27);CHR$(82)
•30 READA$:IFA$="END OF DATA"THENPRINTCHR
$(27);CHR$(78):END
•40 GOSUB110:SCNCLR:CHAR,INT((80-LEN(A$))
/2),12,A$:GOSUB130:FORT=1TO500:NEXTT:GOT
O30
•50 DATA "A"
•60 DATA "PRESENTATION"
•70 DATA "OF"
•80 DATA "TIPS AHOY!"
•90 DATA "END OF DATA"
•100 REM CLOSE CURTAIN
•110 FOR X=86TO6STEP-1:SYS52684,X,35:NEXT
X:RETURN
•120 REM OPEN CURTAIN
•130 FORX=6TO86:SYS52684,X,35:NEXTX:RETUR
N
```

C-64 CHAIN LOADER

Every C-64 programmer who has tried to load a program from within a program (called chaining) has discovered that it is not easy. The best, most compact way I have seen to date is listed below.

–Mike Prestwood
Milpitas, CA

```
•10 A$="PROGRAM NAME"
•20 PRINT"[CLEAR]LOAD A$,8":PRINT"[4"[DOW
N]"]RUN"
•30 POKE631,19:POKE632,13:POKE633,13:POKE
198,3:END
```

WINDOW FILL

Window Fill for the Commodore 64 fills a block or window of any size on the screen with any character. Before calling this routine, the top left corner coordinates of the window must be set, along with the horizontal and vertical

lengths of the window and the character that is to fill this window.

The top left of the screen is taken as (0,0) and the character value is the screen code for the character which fills the window. Also, if the window will not fit on the screen (such as if the coordinates are not on the screen or the lengths are too long) an ILLEGAL QUANTITY error will be printed. The table shows the locations for storing the values of these parameters. —Paul G. Sawyer
Orangeville, ONT

Location	Default	Purpose
49152	–	SYS address
49155	32	Screen code for character
49156	0	Top left X coordinate
49157	0	Top left Y coordinate
49158	10	Horizontal length
49159	10	Vertical length

```
•100 REM ** WINDOW FILL FOR THE C-64 **
•110 FORA=49152TO49321:READB:C=C+B:POKEA,
 B:NEXT
•120 IFC<>20246THENPRINT"ERROR.":END
•130 REM
•140 DATA 76,11,192,32,0,0,10,10,0,0,0
•150 DATA 173,4,192,201,40,176,28,173
•160 DATA 5,192,201,25,176,21,173,6,192
•170 DATA 240,16,173,7,192,240,11,24,173
•180 DATA 4,192,109,6,192,201,41,144,3
•190 DATA 76,72,178,24,173,5,192,109,7
•200 DATA 192,201,26,176,242,173,136,2
•210 DATA 133,254,173,4,192,133,253,173,7
•220 DATA 192,141,8,192,56,169,40,237,6
•230 DATA 192,141,9,192,174,5,192,224,0
•240 DATA 240,13,169,40,141,10,192,32
•250 DATA 147,192,202,224,0,208,248,169
•260 DATA 1,141,10,192,174,6,192,32,162
•270 DATA 192,32,147,192,202,224,0,208
•280 DATA 245,206,8,192,173,8,192,201,0
•290 DATA 208,1,96,173,9,192,141,10,192
•300 DATA 32,147,192,76,105,192,24,165
•310 DATA 253,109,10,192,133,253,165,254
•320 DATA 105,0,133,254,96,160,0,173,3
•330 DATA 192,145,253,96
```

CHARACTER SET COPY

The following routine copies the character set from ROM to RAM so you can use programmable character sets or reconfigure memory. It does this with the speed of ML, but with the ease of BASIC. Type in the BASIC loader and save and run it. The ML is POKEd into memory starting at the address specified by the variable SA in line 5. The routine is relocatable, so just change the value of SA to the new starting address. To use the routine, use "SYS SA,address", where SA is the starting address where you loaded the utility, and "address" is the location in RAM to which you want the computer to copy the character set. The character set copied is the one you are using at the moment (uppercase/graphics or lowercase/uppercase). Set the character set you wish before calling the utility. The address following the SYS may be any expression which when evaluated results in a valid memory location.

```
•5 SA=828
•10 FORI=SATOSA+67:READA:POKEI,A:CK=CK+A:
 NEXT
•20 IFCK<>9282THENPRINT"ERROR IN DATA":ST
 OP
•30 PRINT"[CLEAR]USE SYS"SA",ADDRESS TO A
 CTIVATE"
•100 DATA 32,115,0,32,158,173
•110 DATA 32,155,188,165,101,133
•120 DATA 253,165,100,133,254,173
•130 DATA 24,208,41,14,201,4
•140 DATA 208,3,169,208,44,169
•150 DATA 216,133,252,120,165,1
•160 DATA 41,251,133,1,160,0
•170 DATA 132,251,162,8,177,251
•180 DATA 145,253,200,208,249,230
•190 DATA 252,230,254,202,208,242
•200 DATA 165,1,9,7,133,1
•210 DATA 88,96
```

For example, the statements SYS SA,49152 would place the character set starting at 49152. You can finally forget


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the "REDEFINING CHARACTERS" message forever.

—Peter M.L. Lottrup
Buenos Aires, Argentina

THE TERMINATOR

Ever wonder what the "ALT" key is on the C-128? Here's a reasonably short (80 bytes) ML routine that defines it as an Automatic Line Terminator. The loader asks for an address for storing the ML (for example, 4864), and starts it automatically. It's IRQ-driven, and monitors the ALT key. Once it's active, move the cursor anywhere in the undesired line, and press ALT. The line is deleted without further ado.

Note: there must be a space after the line number for proper operation, so LIST the line(s) first. For safety, it's non-repeating, so you won't accidentally deep-six a needed line by holding the key too long. Lastly, after a RESTORE, use the SYS command given by the program to reactivate it.

—Bob Renaud
Washington, MA

```
•1 REM *** THE TERMINATOR ***
•2 INPUT"[CLEAR]ML ADDRESS";SA:EA=SA+79
•3 I=SA+13:H%=I/256:L%=IAND255
•4 FORJ=SATOEA:READA:POKEJ,A:V=V+A:NEXT
•5 IFV<>9899THENPRINT"[DOWN][RVSON]DATA E
 RROR":END
•6 POKESA+2,L%:POKESA+7,H%:SYSSA
•7 PRINT"AFTER RESTORE, ENTER 'SYS"SA"[LE
 FT]'
•8 END
•10 DATA 120,169,101,141,020,003,169,250
•11 DATA 141,021,003,088,096,165,127,208
•12 DATA 008,165,211,201,008,240,005,133
•13 DATA 250,076,101,250,197,250,240,249
•14 DATA 133,250,032,129,146,027,074,000
•15 DATA 152,072,160,000,177,224,201,032
•16 DATA 240,003,200,208,247,132,236,032
•17 DATA 129,146,027,081,000,169,013,141
•18 DATA 074,003,169,001,133,208,169,032
•19 DATA 141,041,010,104,168,076,101,250
```

64 SCROLL

This routine allows you to scroll characters down from the top to the bottom of the screen. When these characters reach the bottom they disappear. It has many applications that can be easily used in many programs.

For example, the user can choose the character to scroll, so the others onscreen will keep their positions. Another feature is the "collision controller"; when the scrolled character hits another one, the scroll is stopped and the character disappears. This is checked by a particular value at location 2, so if there isn't any collision this value is zero; if there is, the value is 1.

```
IF PEEK(2)=0 -> no collision
IF PEEK(2)=1 -> collision
```

To activate *64 Scroll* enter the ML routine (it's completely relocatable in every area of RAM) and type:

```
SYS LO,CC
```

where LO is the routine starting address. In this case LO is 20776, and CC is the character to scroll; naturally CC isn't the ASCII value but the screen code.

I've included a little demo program that can help you understand better how the routine works. —Genco Ludovico
Moladi Bari, Italy

64 SCROLL LOADER

```
•1000 REM ***********************
•1010 REM *       64 SCROLL     *
•1020 REM * BY GENCO LUDOVICO *
•1030 REM ***********************
•1050 FORA=0TO82:READB:POKE20776+A,B
•1060 C=C+B:NEXTA
•1070 IFC<>12571THENPRINT"ERROR IN DATA S
 TATEMENTS":END
•1100 DATA 32,253,174,32,158
•1110 DATA 183,169,0,133,2
•1120 DATA 134,251,169,191,133
•1130 DATA 252,169,7,133,253
•1140 DATA 160,0,177,252,197
•1150 DATA 251,208,42,170,169
•1160 DATA 32,145,252,160,40
•1170 DATA 209,252,208,6,138
•1180 DATA 145,252,24,144,6
•1190 DATA 169,1,133,2,208
•1200 DATA 19,160,0,165,252
•1210 DATA 133,254,165,253,24
•1220 DATA 105,212,133,255,177
•1230 DATA 254,160,40,145,254
•1240 DATA 198,252,208,202,198
•1250 DATA 253,165,253,201,3
•1260 DATA 208,194,96
```

DEMO

```
•10 REM 64 SCROLL'S DEMO
•20 PRINTCHR$(147):PRINT:PRINT" A":FORK=1
 TO15:PRINT:NEXT
•30 FORK=1TO40:PRINT"B";:NEXT
•40 SYS20776,1:PRINTCHR$(19)"PEEK(2)=";PE
 EK(2)
•50 FORJ=1TO100:NEXT
•60 IFPEEK(2)=0THENGOTO40
```


STOP TYPING!

Routines from *Tips Ahoy!* and *Commodares,* as well as the full-length programs published in this issue, are available on the November *Ahoy!* Disk. See page 52 for ordering information.

EASY80

Manipulating the C-128's VDC Memory

By Peter M.L. Lottrup

The 80-column screen is one of the great additions of the C-128. Unfortunately, except for printing information on it, BASIC 7.0 has not provided any commands to easily manipulate those 16K (or 64K) of VDC memory. No PEEKs, no POKEs. That is—until now!

USING *EASY80*

Easy80 is written entirely in machine language and is presented in the form of a BASIC loader. Use *Bug Repellent* (page 58) to enter the program. Type in the program on page 67 and save it.

To use *Easy80*, load and run the program and activate your new commands with SYS 4864. The new BASIC 7.0 commands will be yours to stay, until you reset the computer or turn the power off. After a reset, you can reenable the commands with a simple SYS 4864.

The routine uses the following memory areas to operate and for buffers:

```
$1300-$1708
786-787
2736
```

Seven commands and two functions are added to BASIC, for easy 80-column access. They will now be described in detail. Remember that parameters that require a VDC RAM address will accept any address between 0 and 65535, for compatibility with both versions of the 8563 chip, with 16K or 64K. If you specify a large address for the 16K version, the address will simply wrap around to zero and the counter will start again, so address 16384 is really address zero on the 16K chip.

VPOKE VDC Address,Value

This command is used just like POKE, to place a value directly in 80-column memory. The address may be any address of VDC RAM (0-16383 if you have the 16K memory chip or 0-65535 if you have the 64K VDC chip, like on the C-128D).

For example:

```
VPOKE 0,1
```

places an "a" in the top-left corner of the 80-column screen.

The parameters used with this command (and the other 80-column access commands) may be any numeric expression which when evaluated returns a valid numeric value for the command.

VPEEK(VDC address)

The VPEEK function is the counterpart of the VPOKE command, and works just like the PEEK function in BASIC, returning the byte value stored in the 80-column address specified. For example:

```
PRINT VPEEK(A+1)
```

prints the value stored in VDC memory address A+1.

VBRING bytes, VDC address, address [,bank]

VBRING, as the name implies, is used to bring a specified number of bytes from VDC RAM to main memory, either in bank 0 RAM or bank 1 RAM. To use VBRING, specify the number of bytes you wish to transfer, the VDC RAM address from which to start moving, the RAM address at which to start storing the bytes, and optionally, the BANK where to store the data. If the bank is omitted, BANK 0 is assumed.

As an example, the following instruction brings the top half of the 80-column screen to the 40-column screen:

```
VBRING 1000,0,DEC("0400"),0
```

As BANK 0 is assumed as default, the "0" could have been left out of the instruction.

VSEND bytes, VDC address, address [,bank]

If you can bring bytes from VDC memory, you can send them there with VSEND. VSEND is used to transfer bytes from bank 0 or bank 1 RAM (or any configuration, including ROM) to the 80-column VDC RAM. Parameters used with the VSEND command are number of bytes to be transferred, address at which to start storing the bytes, CPU address from which to start transferring the bytes, and the optional bank number. Bank 0 is assumed if it is not included.

The following example sends the 40 column screen to the bottom half of the 80-column screen:

```
VSEND 1000,1040,1024
```

VSAVE "filename", VDC start address, VDC end address+1

Now you can save any area of VDC memory directly to disk, without having to move it to system memory first!

VSAVE lets you specify the start and end addresses (+1) of the area you wish to save to disk and the filename. The filename may be any expression which when evaluated returns a valid filename string. Follow the filename by the address of VDC memory from which to start the save and the end-address+1. The memory block will be saved to device 8 using the specified filename. If the filename is not a direct string, enclose the expression in parenthesis. For

example,

```
VSAVE (A$+STR$(1)),0,2040
```

VLOAD "filename" [,VDC start address]

You can load blocks of memory which you have saved with VSAVE, using the VLOAD command. You must specify the filename (variables, wildcards, etc. may be used), and optionally the start address of VDC memory at which to start loading the bytes. If no start address is specified, the closing quote may be ommitted from the filename, and the memory block will be loaded to the same area from which it was originally saved. If you do specify a load address, the old address (on disk) will be ignored, and the data will be loaded to the new address specified. The following example will save the top half of the 80-column screen, clear the screen, and reload the half screen to its standard address (top half) and to the bottom half of the screen, leaving two duplicate halves:

For those of you who do not own a C-128 memory map, here is a brief description of VDC memory (16K version) and control registers:

ADDRESS	DESCRIPTION
0000 - 07FF	Screen memory
0800 - 0FFF	Attribute memory
1000 - 1FFF	Unused memory
2000 - 2FFF	Uppercase/graphics character set
3000 - 3FFF	Lowercase/uppercase character set

REGISTER	FUNCTION
Register 0	Total horizontal characters
Register 1	Horizontal characters displayed
Register 2	Horizontal sync position
Register 3	Sync width
Register 4	Total vertical characters
Register 5	Vertical adjustment
Register 6	Vertical characters displayed
Register 7	Vertical sync position
Register 8	Interlace mode
Register 9	Scan lines per character
Register 10	Cursor mode
Register 11	Cursor end scan line
Register 12	High byte of screen memory start
Register 13	Low byte of screen memory start
Register 14	Cursor address - high
Register 15	Cursor address - low
Register 16	Light pen vertical
Register 17	Light pen horizontal
Register 18	Current address high
Register 19	Current address low
Register 20	Attribute memory high
Register 21	Attribute memory low
Register 22	Horizontal character size
Register 23	Vertical character size
Register 24	Vertical smooth scroll
Register 25	Horizontal smooth scroll
Register 26	Foreground/background color
Register 27	Address increment row
Register 28	Characters - base address/memory type
Register 29	Underline scan line
Register 30	Number of bytes to copy
Register 31	Data register for read and write operations
Register 32	Block start address high
Register 33	Block start address low
Register 34	Horizontal blanking start position
Register 35	Horizontal blanking end position
Register 36	Memory refresh rate per scan line

```
VSAVE "SCREEN",0,1040
SCNCLR
VLOAD "SCREEN"
VLOAD "SCREEN",1040
```

You may also combine VSAVE and VLOAD with BSAVE and BLOAD to save or load the data blocks either in VDC or CPU RAM.

VDUMP

No set of 80-column commands would be complete without an 80-column dump command, so here it is! Enter VDUMP and, if a Commodore-compatible printer is connected and online, the 80-column screen will be dumped to the printer. If you have to type the command in direct mode, you can use ESC-X to move to the 40-column screen and type the command there, so the 80-column screen will remain undisturbed.

Due to particularities of the 80-column screen, which allows you to change character sets without affecting other characters on the screen, remember that the dump will print characters according to the character set currently in use. It is best practice not to change character sets while creating an 80-column screen which you later wish to dump for accurate dumps. The value in memory address $1419 determines what character set the dump will be in. The default setting is "7", for lowercase/uppercase dumps. Adjust it as desired with the following POKEs:

```
POKE DEC("1419"),7 (for lowercase/uppercase)
POKE DEC("1419"),0 (for uppercase/graphics)
```

VWRITE VDC register,value

VWRITE may be used to write a value directly to one of the 37 VDC registers that control 80-column information. Follow VWRITE with the register number you want to write to (0-36) and the value you wish to store there (0-255). Different effects on the 80-column screen can be achieved this way, like reconfiguring the screen size, character size, smooth scrolling, etc.

VREAD(VDC register)

The VREAD function may be used to read the value of any of the 36 VDC registers. Just specify the VDC register you wish to read within parentheses. For example, you may read the value of register 18 and assign it to variable "X" as follows:

```
X=VREAD(18)
```

In some of the VDC registers, some bits always remain set, so you might write one value and when you VREAD

Continued on page 50

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INSERT

Canned Code Concatenator for the Commodore 64

By John K. Lunde

"Save your subroutines"...you've probably heard it. You may even have tried it—and given it up as a lost cause.

The idea's simple enough: suppose you've developed a dandy CURSOR-WITH-GET routine as part of some BASIC program you're writing. Why not save it as a separate subroutine? Then, the next time you write a program that needs a CURSOR-WITH-GET, all you'll have to do is plug it in.

Eventually, the theory goes, you'll have such a library of subroutines that writing a program will be little more than an exercise in chaining disk loads.

It sounds great, and if you follow the advice you'll find in the typical "How to Program BASIC" book, you'll soon have an enviable collection of subroutines with incompatible line numbers that you won't be able to attach to an existing program anywhere except at the end.

To accomplish even that, you'll have to do some heroic PEEKing and POKEing and manually renumber the subroutines once they're in place.

Insert changes the situation. With *Insert*, you can plug any subroutine into any program, anywhere, and line numbers don't matter.

HOW INSERT WORKS

You're beavering away at the keyboard at 3:00 a.m. and suddenly you realize that life would be a lot easier if you'd used a subroutine from your library disk somewhere back in the program.

It's easy enough to get rid of any lines you've written that the subroutine will make unnecessary; but what's next?

First, save your program. Then, LOAD "INSERT",8,1 and enter NEW, then reload your program.

Next, where you want the subroutine to start, type in:

```
LINE# "SUBROUTINENAME
```

This is called a cue line: if you want to insert a subroutine named LOADDISKFILE starting just after line 1260, enter the cue line:

```
1261 "LOADDISKFILE
```

Note that the cue line consists only of the line number, one quote mark, the filename—and nothing else!

Put the disk containing LOADDISKFILE in the drive and enter SYS 49152: your disk drive will whir busily and you'll see the message "LOADDISKFILE BEING INSERTED", and after a few seconds, "ready."

When you LIST the program, you'll discover that LOADDISKFILE, neatly renumbered to fit, now starts where the cue line was.

In fact, the whole program will be renumbered. The new version will start with the same line number as the original did, but have an interval of 10 between lines.

Of course, you don't have to wait for retroactive inspiration to strike before using *Insert:* by building a "skeleton" program like

```
10 INPUT A$
20 IF VAL(A$) THEN 50
30 "CHAR.HANDLER
40 GOTO 60
50 "NUMBER HANDLER
60 PRINT
```

and so forth, then running *Insert,* you can save yourself a lot of typing.

Insert will add several subroutines to a program in a single pass as easily as it will one. You can even put cue lines into your subroutines, so that they'll build themselves out of other subroutines as they're *Insert*ed. (This feature will doubtless amuse the young and madden the ambitious. It may even be useful.)

SAFETY FEATURES

Don't worry if you want to insert several subroutines and they aren't all on the same disk. If *Insert* can't find a file on the current disk, it tells you "FILENAME' IS NOT ON DISK" and goes on to load what files it can find, leaving that cue line intact. All you'll have to do is put the right disk in the drive and enter SYS 49152 again.

Also, if the file is there but unloadable for some reason (for instance, if you accidentally entered the name of a sequential file), *Insert* will tell you " 'filename' is unreadable (error code)".

A final safety feature involves "bad" transfer addresses, for instance, GOTO 110 when there isn't any line 110.

An otherwise admirable renumbering utility I've been using for several years has the abominable habit of turning all the transfer addresses it can't find into 65535: this leaves you going, "Hmm...is that this 65535, or *this* one?"

When *Insert* can't find an address, it leaves the line number unchanged but puts a "#" in front of it; this gives you a chance to refer back to the original program. It also forces a syntax error to keep the renumbered program from running away and hiding in the operating system.

Insert only looks for matching line numbers inside the

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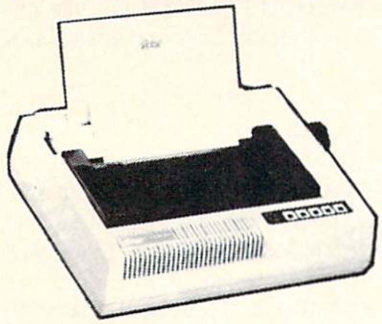
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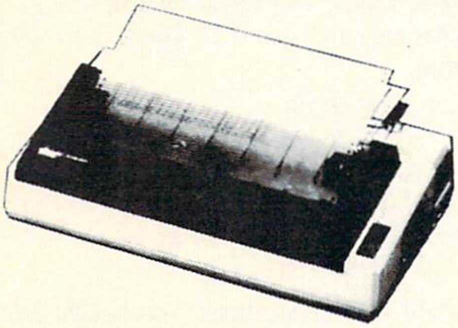
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segment it's renumbering at the moment: the fact that there's a valid line 30 in the target program won't keep a transfer statement to a nonexistent line 30 in a subroutine from being "hatchmarked."

A safety feature you won't find is one to keep the renumbering routine from driving line numbers over the "legal" 63999. Starting from a line number of 10, you'd need to write a 6300 line program to get into trouble. People just don't live that long.

Another missing check would have kept renumbering from generating line lengths of more than 80 bytes in the interest of convenient editing. What I discovered is that a line that's 80 bytes long is already long past editing.

The easy way to avoid long lines is to write short ones in the first place. This is purest heresy to any former VIC owner, but the simple truth is that a program that LISTs black from top to bottom and side to side is a bad program. (As you'll find out when you try to read it a year later.)

One other thing you can do to keep lines to editable length is write your subroutines with high line numbers; that way, no matter how high renumbering drives the line numbers, the line won't be longer than the original.

If you already have a library of subroutines with low line numbers, or you want to make new subroutines out of parts of old, low-numbered programs, you may wonder what good this advice does you.

Simple: *Insert* is also a pretty good renumbering utility. Suppose you want to renumber "TESTFILE"; just put the disk with "TESTFILE" on it in the drive and enter this short program:

```
1000 "TESTFILE
```

Then run *Insert*. If you want to use a different starting line number (this one yields 1000, 1010, etc.) feel free. ☐

SEE PROGRAM LISTING ON PAGE 69

EASY80

Continued from page 46

it, another value is returned. You can just AND the bits you need appropriately.

USING EASY80

Easy80 commands are used just like regular BASIC 7.0 commands. The only time you must be careful is when typing in programs that use *Easy80* commands. This must be done with the *Easy80* routine installed in memory and active for the instructions to be tokenized correctly. Later, when running a program that uses *Easy80* commands, you can have the program install the commands itself, by loading the routine and activating it. This should naturally be done before trying to use any *Easy80* command.

If you redefine 80 column characters, remember that each character uses 16 bytes for its definition, even though only the first eight are actually used. For example:

```
"@" – screen code 0 – $2000
"A" – screen code 1 – $2010
...
```

There are a large number of great effects possible with the 80-character screen and registers. With *Easy80*, you finally have very easy access to all those special features and memory! ☐ *SEE PROGRAM LISTING ON PAGE 67*

SACK RACE

Continued from page 15

to the far left of the screen and moved to the next counter in that direction. If you are at the top and move up, you will appear at the bottom. The same idea holds for being at the bottom and moving down. There are six different items that come down the counters: watermelon, fish, cans, boxes, bottles, and bananas. Just touch the item and it will disappear from the screen and your score will be increased by 10 points. The number of items to be sent to you during a level is equal to 14 × level. So on level 1, 14 items will be sent down; on level 2, 28; and so on. If you need a break, press SHIFT/LOCK. The game will stop and the border will turn blue to signify that the game is paused. Release the lock to resume the game.

Once the game is over, the screen will disappear and the final scores will be displayed. Pressing the button will put the game back to the first choices.

SPECIAL FEATURES

The most obvious feature is that there are 29 sprites on the screen at a time. I have set up a raster interrupt to occur four times while the screen is updating. There can be 7 items on each counter plus the player's figure. The 28 items are fixed to the horizontal position of the counter that they are on. The 29th sprite, the player figure, moves anywhere within those four raster areas. I won't go into any details about how it is accomplished (see past articles), but if you wish to see how I did it, the routine to set up the interrupt begins at $2009. The actual interrupt begins at $2033. The sprites are numbered 0-27. The various values and locations are:

```
X         – $C000-$C01B
Y         – $C023-$C03E
shape     – $C046-$C061
color     – $C069-$C084
X max     – $C08C-$C08F
on/off    – $C091-$C094
```

The program adjusts these locations to change the item's positions. The interrupt puts the appropriate value into the actual sprite locations. Sprite 0 is used as the player.

The counter is made up of redefined character graphics to create the 3-D effect. With the proper colors, the technique is quite effective. Also, by using a black background, the colors of the items, the player, and the counter stand out much better and are more attractive.

I have wanted to make a game like this for quite a while, and finally succeeded in pulling off the graphics to achieve the needed effects. I hope you will enjoy this game, and by looking in at the program, be able to figure out how I got 29 sprites on the screen and used them effectively. ☐

SEE PROGRAM LISTING ON PAGE 70

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COMMODARES

PROGRAMMING CHALLENGES

By Dale Rupert

Each month, we'll present several challenges designed to stimulate your synapses and toggle the bits in your cerebral random access memory. We invite you to send your solutions to:

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PROBLEM #59-1: WILD WARDROBE

This problem was submitted by Mario Segal (Mexico City, Mexico). Generate and print all proper, complete combinations of clothing that can be selected from this wardrobe: blue trousers and black trousers; white, blue, gray, and pink shirts; black, red, and yellow ties; gray, blue and black jackets. Of course, no self-respecting person would wear the black trousers with either the blue shirt or the blue jacket, and you never wear the black tie with the black or blue jackets. All other combinations are valid.

PROBLEM #59-2: FORWARD & BACKWARD

This one is modified from a suggestion by Wallace Leeker (Lemay, MO). Given a target word and a search word, your program determines whether the search word is contained within the target word and, if so, whether it is forward or backward (left to right or right to left). This is *not* a scattered letter puzzle. The letters of the search word must be consecutive in the target.

For example, the search word "Dare" is forward in the target word "Commodares". "Firgle" is backward in the target "Melgrify". "Nerg" is both forward and backward in "Grenergal", and of course there is no "Fun" to be found in "Sadness".

Most back issues of *Ahoy!* are available at $4.00 each. See page 47 for ordering information.

PROBLEM #59-3: INSIDE OUT

Take a string and turn it inside-out from the middle. If the string has an odd number of characters, its middle character remains in the middle. Otherwise the two middle characters go to the two ends of the string. Innermost characters move outward the furthest from the center of the string. Examples will show what words cannot.

COMMODARES	becomes OMMOCSERAD
CHALLENGE	becomes LAHCLEGNE
IS	remains IS
OFTEN	becomes FOTNE
INTERESTING	becomes RETNIEGNITS

PROBLEM #59-4: UPSIDE DOWN

On a 7-segment display of a digital clock or calculator, some of the digits are still valid numerals when viewed upside down. Here is a list of those digits and their upside-down value: 0 & 0, 1 & 1, 2 & 2, 5 & 5, 6 & 9, 8 & 8, 9 & 6.

Your challenge is to write a program which lists all the numbers from 0 to 1 million which equal their upside-down counterpart. 121 is good, and 8698 is good, but 120 and 8691 are no good. Notice that the entire number is turned upside-down, not just the individual digits.

This month we will discuss the most interesting solutions to *Commodares* from the June issue of *Ahoy! Problem #54-1: Joystick Initials* was submitted by Jeff Veasey (Lovington, NM). The problem is to let the user enter three initials on the screen by using the joystick, as in the arcade games. Pressing the joystick right or left cycles through the alphabet at the cursor position on the screen. Pressing the joystick button selects the displayed letter and moves the cursor one space to the right. Although we wanted a "no-frills" solution, you were challenged to include a "back arrow" between the A and the Z which allows the user to move the cursor to the left to correct one of the previous initials.

The shortest of the solutions is this unusual two-liner from Keith Kushner (Brooklyn, NY).

```
·1 REM ===================================
·2 REM    COMMODARES PROBLEM #54-1 :
·3 REM        JOYSTICK INITIALS
·4 REM    SOLUTION BY
·5 REM        KEITH KUSHNER
```

```
•6 REM ===== PORT 1 : C-64 =============
•10 POKE 1520+I,A-31*(A=0):A=Q-INT(Q/27)*
 27:P=255-PEEK(56321):Q=Q-(P=8)+(P=4)
•20 ON-(P<>16)GOTO10:I=I+1+2*(A=0)-((A=0)
 AND(I=0)):ON-(I<3)GOTO10: POKE 198,0
```

Keith's solution is for the C-64 using Joystick Port 1. You can easily modify it for Port 2 and for the C-128. For Port 2, in line 10 replace the 56321 with 56320 and change the 255 to 127. For the C-128, change the 198 in line 20 to 208, the keyboard buffer index.

Keith uses the ON/GOTO statements in line 20 to replace IF-THEN-ELSE statements. The statements in line 20

```
20 ON -(P<>16) GOTO 10 : I=I + ...
```

are equivalent to

```
20 IF P<>16 THEN 10 ELSE I=I + ...
```

Since the C-64 does not allow the ELSE statement, Keith's line 20 would have to be broken into three separate lines:

```
20 IF P<>16 THEN 10
30 I=I + ... : IF I<3 THEN 10
40 POKE 198,0
```

Recall that the expression within parentheses (P< >16) has a value 0 when the expression is false and a value −1 when the expression is true. When P is not equal to 16, the ON-GOTO statement becomes ON −(−1) GOTO 10 or ON 1 GOTO 10. Look up the syntax for the ON-GOTO statement to see that in this case the program branches to line 10; otherwise the next available statement is executed.

The variable A stands for the selected letter A-Z or back arrow. If A is 0, it becomes 31 which is the back-arrow character to be POKEd to screen memory at address 1520+ I. Variable I keeps track of which of the three initials is being entered. The expression −((A=0) AND (I=0)) keeps the letters from going too far left on the screen.

Keith mentioned that I in line 20 is incremented by 1 unless A=0 in which case I is decremented by one. The expression +2*(A=0) has a value −2 whenever A=0. You might want to add a delay loop to "debounce" the joystick input such as this:

```
15 FOR DLAY=1 TO 100: NEXT
```

Now for *Problem #54-2: File Locator* suggested by Dan Mooney (Hinesville, GA). The object is to find the starting and ending addresses of a selected disk file. Dan's solution took up to 20 minutes and he wanted something faster. Naturally, *Commodares* readers to the rescue.

There were two categories of solutions. One group used the file sector pointers to step from sector to sector through the file, counting the number of sectors along the way. Each sector contains a 2-byte pointer to the next sector. The first sector contains 252 bytes of data, whereas all other sectors except the last store 254 bytes. The second byte of the sector pointer in the final sector gives the actual number of bytes in that sector.

Jim Speers (Niles, MI) mentioned that the slowest part of this type of solution can be scanning the directory for the selected filename. You may refer to *Right on Track (Rupert Report*, June 1988 *Ahoy!)* for a discussion of topics related to this type of solution.

The other class of solution uses Dan's idea of opening and actually reading and counting each byte of the file. In BASIC this is slow, but a short machine language routine speeds the process enormously. This program sent by Jim Borden (Carlisle, PA) was written by Larry Louks (Freeport, TX) to whom he gives credit:

```
•1 REM ==================================
•2 REM    COMMODARES PROBLEM #54-2 :
•3 REM        FILE LOCATOR
•4 REM    SOLUTION BY
•5 REM        LARRY LOUKS & JIM BORDEN
•6 REM ==================================
•10 DATA 162,1,32,198,255,32,228,255,230,
 251,208,4,230,252,240,6,165
•20 DATA 144,41,64,240,239,76,204,255
•30 PRINT"[CLEAR][DOWN][RVSON]- ALPHA & O
 MEGA -64 OR 128-":SA=2816:IF FRE(0)=FRE(
 1) THEN SA=49152
•40 FORY=SA TO SA+24: READ K: POKE Y,K: C
 S=CS+K: NEXT
•45 IF CS<>4012 THEN PRINT "DATA ERROR":
 END
•50 INPUT"[3"[DOWN]"] ENTER FILENAME";PN$
 : PRINT: FB=251: FC=252: POKE FB,0: POKE
  FC,0
•60 OPEN 1,8,2,"0:"+PN$: GET#1,A$,B$: D=A
 SC(A$+CHR$(0))+256*ASC(B$+CHR$(0))
•70 PRINT "STARTS AT" D
•80 SYS SA: LN=PEEK(FB)+PEEK(FC)*256: T=D
 +LN-1
•90 PRINT "ENDS AT" T: CLOSE 1
```

The program first POKEs a machine language routine into memory. Notice that the program works on the C-64 and the C-128. The statement at the end of line 30 adjusts the storage location for the machine language routine on the C-64.

Line 60 OPENs the specified file and reads the starting address from its first two bytes. Line 80 calls the machine language routine to read and count bytes of the file. The count is returned in addresses FB and FC. T is the file's ending address which is its starting address plus its number of bytes plus 1.

It takes only a few seconds to determine the initial and final storage addresses of a file 45 blocks long. Christian Castor (Mexico City, Mexico) sent a similar solution which he said takes only 30 seconds for a program 259 blocks long, nearly the biggest possible for the C-64. Christian pointed out that the burst mode on the 1571 or 1581 drives would not speed up the program significantly since there is not very much communication between the computer and the disk drive in this application.

An easier challenge was *Problem #54-3: Written Remainder,* suggested by Gene Majewski (Bellwood, IL). Given

two whole numbers, the computer returns their integer quotient and the remainder.

The algorithm for solving this problem is as follows:

1. Given 2 integers A and B. Find their quotient Q=A/B.
2. Calculate the integer quotient I = INT(Q).
3. Calculate the remainder R = A − I * B or R = (Q − I) * B.

Among the variations on this theme was Jim Borden's added touch of checking B to make sure it is not 0 before doing the division. This solution from Dr. Dave Marquis (Palmetto, FL) takes care of possible internal multiplication roundoff errors.

```
•1 REM ==================================
•2 REM    COMMODARES PROBLEM #54-3 :
•3 REM       WRITTEN REMAINDER
•4 REM    SOLUTION BY
•5 REM       DR. DAVE MARQUIS
•6 REM ==================================
•10 INPUT"[CLEAR][DOWN]WHAT IS THE NUMBER
 TO BE DIVIDED";A
•20 INPUT"[DOWN]WHAT IS THE DIVISOR";B
•30 C=A/B
•40 PRINT"[DOWN][DOWN]"A"/"B" ="INT(C)",
REMAINDER"INT((C-INT(C))*B+.1)
•50 INPUT"[4"[DOWN]"]ANOTHER DIVISION PRO
BLEM (Y/N)";A$
•60 IF A$="Y" THEN 10
```

Line 40 uses the second form of the algorithm above to calculate the remainder. The 0.1 is added and the integer part of the whole quantity is calculated to ensure proper rounding. Can you find any examples for which (C − INT(C)) * B is not equal to INT((C − INT(C))*B+.1)?

This one-liner from Bob Rispoli (Ridge, NY) shows another method used by many readers:

```
•1 REM ==================================
•2 REM    COMMODARES PROBLEM #54-3 :
•3 REM       WRITTEN REMAINDER
•4 REM    SOLUTION BY
•5 REM       BOB RISPOLI
•6 REM ==================================
•10 INPUTA%,B%:Q%=A%/B%:R%=A%-Q%*B%:PRINT
A%"/"B%"="Q%"REMAINDER"R%
```

Bob uses integer variables denoted by the percent signs. Integer variables give a couple of advantages here. They provide automatic error-checking to ensure that the user enters only whole numbers. Also the INT function is not needed in the calculations. The disadvantage of integer variables is that they are limited to a range of −32768 to +32767.

To add some variety to this problem, here is the solution from Jim Speers:

```
/* ========================== */
/* Commodares problem #54-3:  */
/*      Written Remainder     */
/*    Solutions in C by       */
/*       Jim Speers           */
/* ========================== */
main()
{
 int firstnum, nextnum, quotient,
remainder, temp;
printf("Enter two numbers with a space
between. \n");
scanf("%d %d", &firstnum, &nextnum);

 if (firstnum < nextnum)
    {
      temp = firstnum;
      firstnum = nextnum;
      nextnum = temp;
    }
 quotient = firstnum / nextnum;
 remainder = firstnum % nextnum;
 printf(" %d / %d Equals %d. Remainder i
s %d\n", firstnum, nextnum, quotient, re
mainder);
}
```

If it looks a bit foreign, that's because it is written in the language called C. C is similar in its structured appearance to Pascal. Jim's program swaps the two values if the

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first number entered is smaller than the second one.

This is the source code for the program. In order to run the program, the source code must be compiled. A C compiler produces a machine language file which can be LOADed into memory and executed. Lines 180 and 190 are comments. Lines 20 and 170 define a block of code, as do lines 90 and 130. C has a built-in MOD (remainder) function shown as a percent sign in line 150. Notice how messages are formatted for input (SCANF) and output (PRINTF) without the confusing clutter of quotation marks used in BASIC.

The final challenge this month is *Problem #54-4: Birthday Party* from Necah Buyukdura (Ankara, Turkey). The solution is to determine who will attend my birthday party on the basis of these five premises:

1. My friends Bert and Carl cannot tolerate each other. Only one or the other, but not both, will be there.
2. If Adam comes, then Bert will be there also.
3. Either Duke or Emil, or both will come.
4. Duke told me that he would come only if Carl was also there.
5. If Emil comes to my party, certainly neither Adam nor Duke will fail to come.

It is not difficult to see how these premises are translated into the statements in Jim Speer's program below:

```
•1 REM ========================================
•2 REM    COMMODARES PROBLEM #54-4 :
•3 REM        BIRTHDAY PARTY
•4 REM    SOLUTION BY
•5 REM        JIM SPEERS
•6 REM ========================================
•100 FORA=0TO1:FORB=0TO1:FORC=0TO1:FORD=0
TO1:FORE=0TO1
•110 IF((B=1)AND(C=1))OR((B=0)AND(C=0))TH
EN220:REM PREMISE #1
•120 IF((A=1)AND(B=0))THEN220:REM PREMISE
 #2
•130 IF((D=0)AND(E=0))THEN220:REM PREMISE
 #3
•140 IF((D=1)AND(C=0))OR((C=1)AND(D=0))TH
EN220:REM PREMISE #4
•150 IF((E=1)AND((A=0)OR(D=0)))THEN220:RE
M PREMISE #5
•160 IFATHENPRINT"ADAM, ";
•170 IFBTHENPRINT"BERT, ";
•180 IFCTHENPRINT"CARL, ";
•190 IFDTHENPRINT"DUKE, ";
•200 IFETHENPRINT"EMIL, ";
•210 PRINTCHR$(20)CHR$(20)"."
•220 NEXTE,D,C,B,A
```

Every possible combination of values for A through E is generated by the five nested FOR-NEXT loops. From Premise 1, either Bert or Carl but not both will be at the party. Line 110 of Jim's program decides if both of them (B=1 AND C=1) or neither of them (B=0 AND C=0) are in the current combination. If so, none of the other premises are tested, since a contradiction has been found.

A contradiction to Premise 2 occurs if Adam is present but Bert is not. Premise 3 is contradicted only if Duke and Emil are both absent. Premise 4 is a little trickier to interpret. It is obviously contradicted if Duke is there without Carl. It is not clear whether there is a contradiction if Carl is there and Duke doesn't show up. (In logic jargon, in order for Duke to show up, it is *necessary* that Carl be there, but it may not be *sufficient* that Carl is there. Standard English usage is not as rigorous as mathematical English.) It turns out not to matter in this problem anyway. Premise 5 is relevant only if Emil is at the party. A contradiction occurs if Emil is there, but either or both of Adam and Duke are absent. It turns out that only Carl and Duke are at the party.

This all sounds like reverse logic, which in fact it is. It is possible to turn things around. Rather than look for contradictions, test to see that all premises are valid.

W.E. O'Keefe (Niagara Falls, ONT) sent a lengthy solution which analyzed each of the possible combinations and printed out which of the premises are contradicted by each combination. You might enjoy adding these capabilities to your own solution to the problem.

In the meantime, good luck on this month's problems. Keep those solutions and challenges coming. ☐

Congratulations to the following people who also sent valid solutions this month:

Dick Banks (Blytheville, AR)
Sean Bates (N. Stonington, CT)
Leo Brenneman (Erie, PA)
Linda Brown (Maryville, MO)
Carlos Centeno (Lares, PR)
Robert Clark (Ocean Springs, MS)
Richard Cohen (Lanoka Harbor, NJ)
Bob Diamond (Bremerton, WA)
Matthew Ettus (Rego Park, NY)
Craig Ewert (Crystal Lake, IL)
Bruce Glover (Indianapolis, IN)
Judy Groth (Brooklyn, NY)
Kenneth Holt (Toms River, NJ)
Charles Jarvis (Virginia Beach, VA)
Wallace Leeker (Lemay, MO)
Gene Majewski (Bellwood, IL)
Michael Marron (Stony Brook, NY)
Lance McLaughlan (Taranaki, New Zealand)
Mark Miner (Altoona, IA)
Rick Mitchell (Oshawa, ONT)
Brandon Poyner (Kingman, AZ)
Robert Riviere (Kenner, LA)
Sam Robinson (FPO SF, CA)
Andrew Rosenthal (Flushing, NY)
Mario Segal (Mexico City, Mexico)
Timothy Slate (Brattleboro, VT)
Kirk Sloan
Justin Smalley (Boulder, CO)
Mark Tillotson (Tulsa, OK)
Paul Trauth
Roger Walton (Cranford, NJ)
Don Wynkoop (Tucson, AZ)

PROGRAM LISTINGS

Attention new *Ahoy!* readers! You must read the following information very carefully prior to typing in programs listed in *Ahoy!* Certain Commodore characters, commands, and strings of characters and commands will appear in a special format. Follow the instructions and listings guide on this page.

On the following pages you'll find several programs that you can enter on your Commodore computer. But before doing so, read this entire page carefully.

To insure clear reproductions, *Ahoy!'s* program listings are generated on a daisy wheel printer, incapable of printing the commands and graphic characters used in Commodore programs. These are therefore represented by various codes enclosed in brackets [ ]. For example: the SHIFT CLR/HOME command is represented onscreen by a heart. The code we use in our listings is [CLEAR]. The chart below lists all such codes which you'll encounter in our listings, except for one other special case.

The other special case is the COMMODORE and SHIFT characters. On the front of most keys are two symbols. The symbol on the left is obtained by pressing that key while holding down the COMMODORE key; the symbol on the right, by pressing that key while holding down the SHIFT key. COMMODORE and SHIFT characters are represented in our listings by a lower-case "s" or "c" followed by the symbol of the key you must hit. COMMODORE J, for example, is represented by [c J], and SHIFT J by [s J].

Additionally, any character that occurs more than two times in a row will be displayed by a coded listing. For example, [3 "[LEFT]"] would be 3 CuRSoR left commands in a row, [5 "[s EP]"] would be 5 SHIFTed English Pounds, and so on. Multiple blank spaces will be noted in similar fashion: e.g., 22 spaces as [22 " "].

Sometimes you'll find a program line that's too long for the computer to accept (C-64 lines are a maximum of 80 characters, or 2 screen lines long; C-128 lines, a maximum of 160 characters, 2 or 4 screen lines in 40 or 80 columns respectively). To enter these lines, refer to the *BASIC Command Abbreviations Appendix* in your User Manual.

On the next page you'll find our *Bug Repellent* programs for the C-128 and C-64. The version for your machine will help you proofread programs after typing them. (Please note: the *Bug Repellent* line codes that follow each program line, in the whited-out area, should *not* be typed in. See instructions preceding each program.)

On the second page following you will find *Flankspeed*, our ML entry program, and instructions on its use.

Call *Ahoy!* at 212-239-6089 with any problems (if busy or no answer after three rings, call 212-239-0855).

WHEN YOU SEE	IT MEANS	YOU TYPE	YOU WILL SEE	WHEN YOU SEE	IT MEANS	YOU TYPE	YOU WILL SEE
[CLEAR]	Screen Clear	SHIFT CLR/HOME		[BLACK]	Black	CNTRL 1	
[HOME]	Home	CLR/HOME		[WHITE]	White	CNTRL 2	
[UP]	Cursor Up	SHIFT ↑ CRSR ↓		[RED]	Red	CNTRL 3	
[DOWN]	Cursor Down	↑ CRSR ↓		[CYAN]	Cyan	CNTRL 4	
[LEFT]	Cursor Left	SHIFT ← CRSR →		[PURPLE]	Purple	CNTRL 5	
[RIGHT]	Cursor Right	← CRSR →		[GREEN]	Green	CNTRL 6	
[SS]	Shifted Space	SHIFT Space		[BLUE]	Blue	CNTRL 7	
[INSERT]	Insert	SHIFT INST/DEL		[YELLOW]	Yellow	CNTRL 8	
[DEL]	Delete	INST/DEL		[F1]	Function 1	F1	
[RVSON]	Reverse On	CNTRL 9		[F2]	Function 2	SHIFT F1	
[RVSOFF]	Reverse Off	CNTRL 0		[F3]	Function 3	F3	
[UPARROW]	Up Arrow	↑	↑	[F4]	Function 4	SHIFT F3	
[BACKARROW]	Back Arrow	←	←	[F5]	Function 5	F5	
[PI]	PI	π	π	[F6]	Function 6	SHIFT F5	
[EP]	English Pound	£	£	[F7]	Function 7	F7	
				[F8]	Function 8	SHIFT F7	

BUG REPELLENT FOR THE 64 & 128 By BUCK CHILDRESS

Please note: the *Bug Repellent* programs listed here are for *Ahoy!* programs published from the May 1987 issue onward! For older programs, use the older version.

Type in, save, and run *Bug Repellent.* You'll be asked if you want automatic saves to take place. If so, you're prompted for the device, DISK (D) or TAPE (T). You then pick a starting file number, 0 through 99. Next, you enter a name, up to 14 characters long. At this point, *Bug Repellent* verifies your entries and gives you a chance to change them if you want. If no changes are needed, *Bug Repellent* activates itself. (Pressing RETURN without answering the prompts defaults to disk drive and begins your files with "00BACKUP".)

Type NEW and begin entering an *Ahoy!* program. As you enter program lines and press RETURN, a *Bug Repellent* code appears at the top of your screen. If it doesn't match the code in the program listing, an error exists. Correct the line and the codes will match.

If used, automatic saves take place every 15 minutes. When the RETURN key is pressed on a program line, the screen changes color to let you know that a save will begin in about three seconds. You may cancel the save by pressing the RUN STOP key. The file number increments after each save. It resets to 00 if 99 is surpassed. After saving, or cancelling, the screen returns to its original color and the timer resets for 15 minutes.

When you've finished using *Bug Repellent*, deactivate it by typing SYS 49152 [RETURN] for the Commodore 64 or SYS 4864 [RETURN] for the Commodore 128.

C-64 BUG REPELLENT

```
•10 PRINTCHR$(147)"LOADING AND CHECKING THE DATA[3"."]":J
=49152
•20 FORB=0TO11:READA:IFA<0ORA>255THEN40
•30 POKEJ+B,A:X=X+A:NEXTB:READA:IFA=XTHEN50
•40 PRINT:PRINT"ERROR IN DATA LINE:"PEEK(64)*256+PEEK(63)
:END
•50 X=0:J=J+12:IFJ<49456THEN20
•60 POKE198,0:POKE49456,0:A$="Y":B$=A$:C$="D":D$="DISK":D
=8:PRINTCHR$(147)
•70 INPUT"DO YOU WANT AUTOMATIC SAVES (Y/N)";A$:PRINT:IFA
$="Y"THEN90
•80 PRINT"NO AUTOMATIC SAVES[3"."]":GOTO150
•90 POKE49456,1:INPUT"DISK OR TAPE (D/T)";C$:IFC$<>"D"THE
ND=1:D$="TAPE"
•100 POKE49457,D:D$=D$+" DRIVE":PRINT:INPUT"FILE NUMBER (
0-99)";N
•110 N$=RIGHT$(STR$(N),2):IFN<10THENN$=CHR$(48)+CHR$(N+48
)
•120 F$="BACKUP":PRINT:INPUT"FILENAME";F$:F$=N$+LEFT$(F$,
14):L=LEN(F$)
•130 POKE49458,L:FORJ=1TOL:POKE49458+J,ASC(MID$(F$,J,1)):
NEXTJ:PRINT
•140 PRINT"SAVING DEVICE ** "D$:PRINT"STARTING WITH ** "F
$
•150 PRINT:INPUT"IS THIS CORRECT (Y/N)";B$:IFB$<>"Y"THEN6
0
•160 POKE770,131:POKE771,164:SYS49152:END
•170 DATA169,79,32,210,255,162,38,160,192,204,3,3,1507
•180 DATA208,10,162,131,160,164,169,70,32,210,255,44,1615
•190 DATA169,78,32,210,255,142,2,3,140,3,3,76,1113
•200 DATA36,193,32,96,165,134,122,132,123,32,115,0,1180
•210 DATA170,240,243,162,255,134,58,144,3,76,150,164,1799
•220 DATA32,107,169,32,121,165,173,0,2,240,5,169,1215
•230 DATA79,141,2,3,76,162,164,169,0,133,2,133,1064
•240 DATA251,133,252,133,254,24,101,20,69,254,230,254,197
5
•250 DATA24,101,21,69,254,170,230,254,164,252,185,0,1724
•260 DATA2,133,253,201,34,208,6,165,2,73,255,133,1465
•270 DATA2,201,32,208,4,165,2,240,8,138,24,101,1125
•280 DATA253,69,254,170,44,198,254,230,252,164,253,208,23
49
•290 DATA213,138,41,240,74,74,74,74,24,105,129,141,1327
•300 DATA44,193,138,41,15,24,105,129,141,45,193,162,1230
•310 DATA0,189,43,193,240,12,157,0,4,173,134,2,1147
•320 DATA157,0,216,232,208,239,169,38,141,2,3,173,1578
•330 DATA48,193,240,23,165,161,201,212,176,4,165,160,1748
•340 DATA240,13,238,32,208,160,0,32,225,255,208,6,1617
•350 DATA32,33,193,76,38,192,232,208,242,200,208,239,1893
•360 DATA32,68,229,169,0,168,174,49,193,32,186,255,1555
•370 DATA173,50,193,162,51,160,193,32,189,255,169,43,1670
•380 DATA166,45,164,46,32,216,255,162,1,189,51,193,1520
•390 DATA168,200,152,201,58,144,2,169,48,157,51,193,1543
•400 DATA201,48,208,3,202,16,234,32,33,193,76,116,1362
•410 DATA164,206,32,208,169,0,170,168,76,219,255,160,1827
•420 DATA1,1,160,0,0,65,72,79,89,33,0,0,500
```

C-128 BUG REPELLENT

```
•10 PRINTCHR$(147)"LOADING AND CHECKING THE DATA[3"."]":J
=4864
•20 FORB=0TO11:READA:IFA<0ORA>255THEN40
•30 POKEJ+B,A:X=X+A:NEXTB:READA:IFA=XTHEN50
•40 PRINT:PRINT"ERROR IN DATA LINE:"PEEK(66)*256+PEEK(65)
:END
•50 X=0:J=J+12:IFJ<5213THEN20
•60 POKE208,0:POKE5213,0:A$="Y":B$=A$:C$="D":D$="DISK":D=
8:PRINTCHR$(147)
•70 INPUT"DO YOU WANT AUTOMATIC SAVES (Y/N)";A$:PRINT:IFA
$="Y"THEN90
•80 PRINT"NO AUTOMATIC SAVES[3"."]":GOTO150
•90 POKE5213,1:INPUT"DISK OR TAPE (D/T)";C$:IFC$<>"D"THEN
D=1:D$="TAPE"
•100 POKE5214,D:D$=D$+" DRIVE":PRINT:INPUT"FILE NUMBER (0
-99)";N
•110 N$=RIGHT$(STR$(N),2):IFN<10THENN$=CHR$(48)+CHR$(N+48
)
•120 F$="BACKUP":PRINT:INPUT"FILENAME";F$:F$=N$+LEFT$(F$,
14):L=LEN(F$)
•130 POKE5215,L:FORJ=1TOL:POKE5215+J,ASC(MID$(F$,J,1)):NE
XTJ:PRINT
•140 PRINT"SAVING DEVICE ** "D$:PRINT"STARTING WITH ** "F
$
•150 PRINT:INPUT"IS THIS CORRECT (Y/N)";B$:IFB$<>"Y"THEN6
0
•160 POKE770,198:POKE771,77:SYS4864:END
•170 DATA32,58,20,169,41,162,19,236,3,3,208,4,955
•180 DATA169,198,162,77,141,2,3,142,3,3,224,19,1143
•190 DATA208,7,32,125,255,79,78,0,96,32,125,255,1292
•200 DATA79,70,70,0,96,162,0,134,251,189,0,2,1053
•210 DATA240,19,201,48,144,9,201,58,176,5,133,251,1485
•220 DATA232,208,238,134,252,165,251,208,3,76,198,77,2042
•230 DATA169,0,166,235,164,236,133,253,133,254,142,47,193
2
•240 DATA20,140,48,20,24,101,22,69,254,230,254,24,1206
•250 DATA101,23,69,254,170,230,254,164,252,185,0,2,1704
•260 DATA133,251,201,34,208,6,165,253,73,255,133,253,1965
•270 DATA201,32,208,4,165,253,240,8,138,24,101,251,1625
•280 DATA69,254,170,44,198,254,230,252,164,251,208,213,23
07
•290 DATA138,41,240,74,74,74,74,24,105,65,141,88,1138
•300 DATA20,138,41,15,24,105,65,141,89,20,32,79,769
•310 DATA20,189,85,20,240,6,32,210,255,232,208,245,1742
•320 DATA174,47,20,172,48,20,24,32,240,255,173,93,1298
•330 DATA20,240,27,165,161,201,212,176,4,165,160,240,1771
•340 DATA17,32,65,20,238,32,208,238,1,214,32,225,1322
•350 DATA255,208,6,32,49,20,76,198,77,232,208,242,1603
•360 DATA200,208,239,32,66,193,173,95,20,162,96,160,1644
•370 DATA20,32,189,255,169,0,170,32,104,255,169,0,1395
•380 DATA174,94,20,168,32,186,255,169,45,174,16,18,1351
•390 DATA172,17,18,32,216,255,162,1,189,96,20,168,1346
•400 DATA200,152,201,58,144,2,169,48,157,96,20,201,1448
•410 DATA48,208,3,202,16,234,32,49,20,141,0,2,955
•420 DATA76,183,77,58,59,32,65,20,206,32,208,206,1222
•430 DATA1,214,169,0,170,168,76,219,255,32,79,20,1403
•440 DATA169,26,141,0,214,173,0,214,16,251,96,162,1462
•450 DATA0,142,0,255,96,19,18,32,32,32,32,146,804
•460 DATA0,1,0,0,65,72,79,89,33,0,0,0,339
```

FLANKSPEED FOR THE C-64 By GORDON F. WHEAT

Flankspeed will allow you to enter machine language *Ahoy!* programs without any mistakes. Once you have typed the program in, save it for future use. While entering an ML program with *Flankspeed* there is no need to enter spaces or hit the carriage return. This is all done automatically. If you make an error in a line a bell will ring and you will be asked to enter it again. To LOAD in a program Saved with *Flankspeed* use LOAD "name",1,1 for tape, or LOAD "name",8,1 for disk. The function keys may be used after the starting and ending addresses have been entered.

f1–SAVEs what you have entered so far.

f3–LOADs in a program worked on previously.

f5–To continue on a line you stopped on after LOADing in the previous saved work.

f7–Scans through the program to locate a particular line, or to find out where you stopped the last time you entered the program. It temporarily freezes the output as well.

```
·100 POKE53280,12:POKE53281,11                               OP
·105 PRINT"[CLEAR][c 8][RVSON][15" "]FLANKSPEED[15" "]";     FP
·110 PRINT"[RVSON][5" "]MISTAKEPROOF ML ENTRY PROGRAM[6" "
 ]"                                                          JP
·115 PRINT"[RVSON][9" "]CREATED BY G. F. WHEAT[9" "]"        FA
·120 PRINT"[RVSON][3" "]COPR. 1987, ION INTERNATIONAL INC.
 [3" "]"                                                     AJ
·125 FORA=54272TO54296:POKEA,0:NEXT                          ND
·130 POKE54272,4:POKE54273,48:POKE54277,0:POKE54278,249:PO
 KE54296,15                                                  NP
·135 FORA=680TO699:READB:POKEA,B:NEXT                        FL
·140 DATA169,251,166,253,164,254,32,216,255,96               FF
·145 DATA169,0,166,251,164,252,32,213,255,96                 EK
·150 B$="STARTING ADDRESS IN HEX":GOSUB430:AD=B:SR=B         KP
·155 GOSUB480:IFB=0THEN150                                   OE
·160 POKE251,T(4)+T(3)*16:POKE252,T(2)+T(1)*16               AM
·165 B$="ENDING ADDRESS IN HEX":GOSUB430:EN=B                PE
·170 GOSUB470:IFB=0THEN150                                   PG
·175 POKE254,T(2)+T(1)*16:B=T(4)+1+T(3)*16                   GM
·180 IFB>255THENB=B-255:POKE254,PEEK(254)+1                  HG
·185 POKE253,B:PRINT                                         EC
·190 REM  GET HEX LINE                                       ED
·195 GOSUB495:PRINT": [c P][LEFT]";:FORA=0TO8                KD
·200 FORB=0TO1:GOTO250                                       IH
·205 NEXTB                                                   IJ
·210 A%(A)=T(1)+T(0)*16:IFAD+A-1=ENTHEN340                   FA
·215 PRINT" [c P][LEFT]";                                    EG
·220 NEXTA:T=AD-(INT(AD/256)*256):PRINT" "                   II
·225 FORA=0TO7:T=T+A%(A):IFT>255THENT=T-255                  GL
·230 NEXT                                                    GI
·235 IFA%(8)<>TTHENGOSUB375:GOTO195                          FL
·240 FORA=0TO7:POKEAD+A,A%(A):NEXT:AD=AD+8:GOTO195           IM
·245 REM    GET HEX INPUT                                    PA
·250 GETA$:IFA$=""THEN250                                    GA
·255 IFA$=CHR$(20)THEN305                                    GO
·260 IFA$=CHR$(133)THEN535                                   LM
·265 IFA$=CHR$(134)THEN560                                   IG
·270 IFA$=CHR$(135)THENPRINT" ":GOTO620                      HO
·275 IFA$=CHR$(136)THENPRINT" ":GOTO635                      HE
·280 IFA$>"@"ANDA$<"G"THENT(B)=ASC(A$)-55:GOTO295            MI
·285 IFA$>"/"ANDA$<":"THENT(B)=ASC(A$)-48:GOTO295            DJ
·290 GOSUB415:GOTO250                                        JA
·295 PRINTA$"[c P][LEFT]";                                   PK
·300 GOTO205                                                 FA
·305 IFA>0THEN320                                            BI
·310 A=-1:IFB=1THEN330                                       BB
·315 GOTO220                                                 FA
·320 IFB=0THENPRINTCHR$(20);CHR$(20);:A=A-1                  BF
·325 A=A-1                                                   FK
·330 PRINTCHR$(20);:GOTO220                                  PH
·335 REM LAST LINE                                           CP
·340 PRINT" ":T=AD-(INT(AD/256)*256)                         KH
·345 FORB=0TOA-1:T=T+A%(B):IFT>255THENT=T-255                OD
·350 NEXT                                                    OB
·355 IFA%(A)<>TTHENGOSUB375:GOTO195                          LH
·360 FORB=0TOA-1:POKEAD+B,A%(B):NEXT                         BO
·365 PRINT:PRINT"YOU ARE FINISHED!":GOTO535                  MB
·370 REM BELL AND ERROR MESSAGES                             LM
·375 PRINT:PRINT"LINE ENTERED INCORRECTLY":PRINT:GOTO415     JK
·380 PRINT:PRINT"INPUT A 4 DIGIT HEX VALUE!":GOTO415         PG
·385 PRINT:PRINT"ENDING IS LESS THAN STARTING!":B=0:GOTO41
 5                                                           IK
·390 PRINT:PRINT"ADDRESS NOT WITHIN SPECIFIED RANGE!":B=0:
 GOTO415                                                     HK
·395 PRINT:PRINT"NOT ZERO PAGE OR ROM!":B=0:GOTO415          DM
·400 PRINT"?ERROR IN SAVE":GOTO415                           JK
·405 PRINT"?ERROR IN LOAD":GOTO415                           IO
·410 PRINT:PRINT:PRINT"END OF ML AREA":PRINT                 JO
·415 POKE54276,17:POKE54276,16:RETURN                        BF
·420 OPEN15,8,15:INPUT#15,A,A$:CLOSE15:PRINTA$:RETURN        DH
·425 REM GET FOUR DIGIT HEX                                  IM
·430 PRINT:PRINTB$;:INPUTT$                                  OL
·435 IFLEN(T$)<>4THENGOSUB380:GOTO430                        JD
·440 FORA=1TO4:A$=MID$(T$,A,1):GOSUB450:IFT(A)=16THENGOSUB
 380:GOTO430                                                 AK
·445 NEXT:B=(T(1)*4096)+(T(2)*256)+(T(3)*16)+T(4):RETURN     KB
·450 IFA$>"@"ANDA$<"G"THENT(A)=ASC(A$)-55:RETURN             GM
·455 IFA$>"/"ANDA$<":"THENT(A)=ASC(A$)-48:RETURN             NJ
·460 T(A)=16:RETURN                                          IC
·465 REM ADDRESS CHECK                                       OL
·470 IFAD>ENTHEN385                                          HO
·475 IFB<SRORB>ENTHEN390                                     LE
·480 IFB<256OR(B>40960ANDB<49152)ORB>53247THEN395            OB
·485 RETURN                                                  HE
·490 REM ADDRESS TO HEX                                      PM
·495 AC=AD:A=4096:GOSUB520                                   AP
·500 A=256:GOSUB520                                          NF
·505 A=16:GOSUB520                                           LG
·510 A=1:GOSUB520                                            HE
·515 RETURN                                                  JD
·520 T=INT(AC/A):IFT>9THENA$=CHR$(T+55):GOTO530              OC
·525 A$=CHR$(T+48)                                           JI
·530 PRINTA$;:AC=AC-A*T:RETURN                               AA
·535 A$="**SAVE**":GOSUB585                                  IC
·540 OPEN1,T,1,A$:SYS680:CLOSE1                              AB
·545 IFST=0THENEND                                           FB
·550 GOSUB400:IFT=8THENGOSUB420                              PM
·555 GOTO535                                                 FI
·560 A$="**LOAD**":GOSUB585                                  PE
·565 OPEN1,T,0,A$:SYS690:CLOSE1                              PO
·570 IFST=64THEN195                                          OI
·575 GOSUB405:IFT=8THENGOSUB420                              CO
·580 GOTO560                                                 GN
·585 PRINT" ":PRINTTAB(14)A$                                 KA
·590 PRINT:A$="":INPUT"FILENAME";A$                          IO
·595 IFA$=""THEN590                                          HK
·600 PRINT:PRINT"TAPE OR DISK?":PRINT                        HL
·605 GETB$:T=1:IFB$="D"THENT=8:A$="@0:"+A$:RETURN            NP
·610 IFB$<>"T"THEN605                                        KO
·615 RETURN                                                  PH
·620 B$="CONTINUE FROM ADDRESS":GOSUB430:AD=B                DD
·625 GOSUB475:IFB=0THEN620                                   NK
·630 PRINT:GOTO195                                           HN
·635 B$="BEGIN SCAN AT ADDRESS":GOSUB430:AD=B                FK
·640 GOSUB475:IFB=0THEN635                                   LN
·645 PRINT:GOTO670                                           HI
·650 FORB=0TO7:AC=PEEK(AD+B):GOSUB505:IFAD+B=ENTHENAD=SR:G
 OSUB410:GOTO195                                             LM
·655 PRINT" ";:NEXTB                                         LE
·660 PRINT:AD=AD+8                                           CD
·665 GETB$:IFB$=CHR$(136)THEN195                             JD
·670 GOSUB495:PRINT": ";:GOTO650                             KE
```

IMPORTANT! Letters on white background are **Bug Repellent** line codes. **Do not enter them!** Pages 57 and 58 explain these codes and provide other essential information on entering *Ahoy!* programs. Refer to these pages **before** entering any programs!

COMPILING STRINGS
FROM PAGE 20

MINI-COMP

```
•1 REM================================== IH
•2 REM             MINI-COMP              BA
•3 REM          RUPERT REPORT #59         OK
•4 REM  A MINIMAL COMPILER FOR THE C-64   IN
•5 REM======= RUN 2000 TO COMPILE ======  CI
•8 REM THESE ARE ALL ALLOWED TYPES OF STA
 TEMENTS                                  ME
•9 REM A AND A% BOTH REPRESENT THE SAME I
 NTEGER                                   AE
•10 A=50                                  GP
•20 B=-10                                 AI
•30 C=A                                   FD
•40 D=A+B                                 FH
•50 IF A=B THEN 60                        AE
•60 GOTO 70                               CJ
•70 PRINT                                 OB
•80 PRINT A                               CO
•90 PRINT B;                              HH
•100 PRINT CHR$(C)                        FC
•110 PRINT CHR$(D);                       LO
•120 A$=CHR$(C)                           PH
•130 B$="HELLO"                           GO
•140 C$=A$                                AE
•150 B$=B$+A$                             BM
•160 PRINT A$                             JP
•170 PRINT B$;                            OF
•999 END                                  GK
•1000 REM --- COMMON ROUTINES ---         NM
•1100 C=PEEK(M): M=M+1: PRINT C,: IF C=32
 THEN 1100: REM IGNORE SPACES             HG
•1110 IF C=0 THEN PRINT                   EO
•1120 RETURN                              PC
•1300 VT=0: REM VT=0, NOT A VARIABLE; VT=
 1, INTEGER; VT=2, STRING                 NI
•1310 IF C<65 OR C>90 THEN RETURN :REM NO
 T A VARIABLE                             NK
•1320 VN=C: C1=PEEK(M): M=M+1: REM VN=VAR
 NAME                                     NP
•1330 IF C1=36 THEN VT=2: PRINT C1,: RETU
 RN: REM '$ STRING VAR                    FM
•1340 IF C1=37 THEN VT=1: GOTO 1360: PRIN
 T C1,: REM '% INTEGER VAR                AD
•1350 VT=1: M=M-1: GOTO 1360:  REM DEFAUL
 T=INTEGER                                KK
•1355 M=M-1: RETURN: REM NOT A VARIABLE   GH
•1360 AD=(VN-65)*2+VM                     LF
•1370 NX=AD: GOSUB 1400: A0=NL: A1=NH     GA
•1380 NX=AD+1: GOSUB 1400: A2=NL: A3=NH   EI
•1390 RETURN                              AB
•1400 NH=INT(NX/256)                      KK
•1410 NL=NX-256*NH                        AC
•1420 RETURN                              BP
•1500 FOR KK=1 TO N                       MG
•1510 IF CM>EM THEN PRINT"OUT OF MEMORY -
 COMPILED PRGM TOO LARGE": END            ED
•1520 POKE CM,C(KK)                       FK
•1530 PRINT CM;":";C(KK)                  EC
•1540 CM=CM+1: NEXT                       HN
•1550 RETURN                              KC
•1600 REM GET ADDR OF STRING VAR WITH NAM
 E IN VN                                  JC
•1620 SV=VN-65   :REM STRING VARIABLE #   GO
•1630 IF SV<0 OR SV>25 THEN EC=65: GOSUB
 10000: STOP                              AC
•1640 IF SB(SV)=0 THEN GOTO 1660    :REM
 NEW STRING                               ED
•1650 MEM=EM-SB(SV)*256+1: GOTO 1690      OK
•1660 NB=NB+1: IF NB>26 THEN PRINT"TOO MA
 NY STRING VARIABLES": STOP               JC
•1670 SB(SV)=NB  :REM BLOCK #             JM
•1680 MEM=EM-NB*256+1: IF (MEM-CM)<256 TH
 EN PRINT"OUT OF STRING SPACE": STOP      HK
•1690 NX=MEM: GOSUB 1400: RETURN   :REM A
 DDR IN NL/NH                             DI
•2000 REM === INITIALIZATION ======       AG
•2010 DIM LL(50,2)       :REM LL(N,1)=LINE
 # OF NTH LINE                            ON
•2015 :REM  LL(N,2)=COMPILED MEM LOCATION
 OF THIS LINE                             DC
•2020 DIM C(100)    :REM STORES OBJECT COD
 E BYTES                                  EE
•2030 FALSE=0: TRUE=NOT FALSE             IG
•2040 DEF FNPTR(M)=PEEK(M)+256*PEEK(M+1)  EH
•2050 VM=49152   :REM $C000 START OF VARIA
 BLE MEM                                  AG
•2060 PM=49408   :REM $C100 START OF OBJEC
 T MEMORY                                 LM
•2070 EM=53247   :REM $CFFF END OF OBJECT
 MEMORY                                   BK
•2075 DIM SB(25), S(255): SM=52992: NB=0
 :REM STRING VARIABLES                    IA
•2080 BT=2049    :REM $0800 START OF BASIC
 TEXT                                     MC
•2085 GOSUB 11000    :REM PUT PRINT RTN IN
 MEM                                      DI
•2090 M=BT          :REM NEXT SOURCE MEMORY
 TO PEEK                                  BA
•2100 SN=1       :REM CURRENT SOURCE STATE
 MENT NUMBER                              DB
•2110 CM=PM         :REM NEXT OBJECT MEMORY
 TO POKE                                  NL
•2120 FOR N=VM TO VM+51: POKE N,0: NEXT :
 REM CLR VAR'S                            EM
•2125 REM ============ MAIN ============ MI
•2130 PTR=FNPTR(M): M=M+2    :REM NEXT LIN
 E PTR                                    LJ
```

```
•2140 LN=FNPTR(M): M=M+2        :REM CURRENT
 LINE #                                    IC
•2150 IF LN>999 THEN PRINT "[3"="] END OF
 PASS 1 [3"="]": GOTO 2400                 BE
•2160 PRINT "[5" "]CURRENT LINE # ="; LN   HC
•2170 LL(SN,1)=LN       :REM CURRENT LINE # EG
•2180 LL(SN,2)=CM           :REM START OBJ
 MEM LOC                                   GC
•2190 SN=SN+1     :REM # SOURCE STATEMENTS AG
•2200 REM --- GET BYTE ---                 FP
•2210 GOSUB 1100     :REM FETCH NEXT BYTE  EO
•2220 GOSUB 1300: IF VT=1 THEN GOSUB 3000
 : GOTO 2290: REM 'VARIABLE                HG
•2225 IF VT=2 THEN GOSUB 9000: GOTO 2290
 :REM STRING VARIABLE                      GD
•2230 IF C=139 THEN GOSUB 4000: GOTO 2290
 : REM 'IF                                 PL
•2240 IF C=137 THEN GOSUB 5000: GOTO 2290
 : REM 'GOTO                               LN
•2250 IF C=153 THEN GOSUB 6000: GOTO 2290
 : REM 'PRINT                              BE
•2260 IF C=128 THEN GOSUB 7000: GOTO 2290
 : REM 'END                                BA
•2270 IF C=143 THEN GOSUB 8000: GOTO 2290
 : REM 'REM                                AB
•2280 PRINT "UNKNOWN COMMAND CODE";C;"IN
 LINE";LL(SN,1):STOP                       IP
•2290 IF C>0 THEN EC=0: GOSUB 10000: STOP
 :REM 'EOL                                 CH
•2300 GET K$:IF K$="" THEN 2130 :REM BACK
 FOR MORE                                  OA
•2310 GET K$:IF K$="" THEN 2310            LD
•2320 GOTO 2130                            GC
•2400 REM  - PASS 2 - FIX JUMP ADDRESSES   DN
•2410 IF JI=0 THEN 2570 :REM NO JUMPS      OO
•2420 FOR N=1 TO JI    :REM CHECK ITEMS IN
 JUMP TABLE                                PG
•2430 :MM=JT(N,1) :REM REFERENCED LINE #   AD
•2440 :FOR J=1 TO SN     :REM CHECK ACTUAL
 LINE #S                                   AA
•2445 :REM  - GET OBJ MEM TARGET ADDRESS
 AND JMP ADDRESS:                          NE
•2450 :IF MM=LL(J,1) THEN TADDR=JT(N,2):
 JADDR=LL(J,2): GOTO 2490                  JH
•2460 :NEXT J                              KG
•2470 :REM NO MATCH FOUND                  OI
•2480 :EC=1: LN=JT(N,0): GOSUB 10000:STOP  HB
•2490 :NX=JADDR :REM ADDR OF LINE # MM     CB
•2530 :GOSUB 1400 :REM CONVERT LINE #      KB
•2540 :POKE TADDR,NL       :REM USE ADDR IN
 JUMP TABLE                                EP
•2550 :POKE TADDR+1,NH                     NL
•2560 NEXT N     :REM NEXT JUMP TABLE ITEM JJ
•2570 PRINT"[3"="] END OF PASS 2 [3"="]"   ON
•2580 PRINT"TO EXECUTE THE COMPILED PROGR
 AM, ENTER"                                HP
•2590 PRINT" SYS"; PM                      AA
•2595 PRINT"OBJECT CODE RESIDES FROM";PM;
 "TO";CM-1                                 OJ
•2600 END                                  LC
•3000 REM <<<  A=(-)NN, A=B, A=B+C >>>     GL
•3010 D0=A0: D1=A1 :REM ADDR OF A'S LSB    GE
•3020 D2=A2: D3=A3 :REM A'S MSB            HA
•3030 GOSUB 1100: IF C<>178 THEN 9000 :RE
 M NOT '=                                  PE
•3040 GOSUB 1100    :REM '-, NN, OR B      DJ
•3050 GOSUB 1300: IF VT=1 THEN 3400        AL
•3055 REM <<< A=(-)NN >>>                  LP
•3060 IF C=171 THEN C$="-" :REM '-         HM
•3065 IF C<>171 THEN C$=" "+CHR$(C) :REM
 '0-9                                      DI
•3070 GOSUB 1100  :REM GET DIGITS OF NN    FN
•3080 IF C=0 THEN 3120                     DB
•3085 IF CHR$(C)<"0" OR CHR$(C)>"9" THEN
 EC=48: GOSUB 10000: STOP                  LM
•3090 C$=C$+CHR$(C)                        LJ
•3100 GOTO 3070                            HP
•3120 NN=VAL(C$)                           OO
•3130 NN%=NN    :REM ERROR CHECK           BO
•3140 IF NN<0 THEN NN=NN+65536        :REM
 CONVERT (-32768,32767) TO (0,65535)       HG
•3150 NX=NN: GOSUB 1400                    NH
•3170 MSB=NH: LSB=NL                       AB
•3175 :REM LDA #NN(LSB), STA A(LSB), LDA
 #NN(MSB), STA A(MSB)                      EG
•3180 N=10: C(1)=169: C(2)=LSB: C(3)=141:
 C(4)=D0: C(5)=D1                          NP
•3190 C(6)=169: C(7)=MSB: C(8)=141: C(9)=
 D2: C(10)=D3                              CN
•3200 GOSUB 1500     :REM POKE VALUES INTO
 OBJECT MEMORY                             HF
•3210 RETURN                               CE
•3400 REM <<< A=B OR A=B+C >>>             BN
•3410 S0=A0: S1=A1    :REM B'S LSB ADDR    PN
•3420 S2=A2: S3=A3    :REM B'S MSB         AL
•3430 GOSUB 1100                           LO
•3440 IF C=0 THEN 3600     :REM A=B        DM
•3450 REM <<< A=B+C >>>                    KF
•3460 IF C<>170 THEN EC=170:  EC$=" + ":
 GOSUB 10000: STOP :REM TEST '+            HG
•3470 GOSUB 1100: GOSUB 1300: IF VT<>1 TH
 EN EC=65: GOSUB 10000: STOP: REM 'C       CM
•3480 GOSUB 1100: IF C>0 THEN EC=0: GOSUB
 10000: STOP :REM 'EOL                     ME
•3490 S4=A0: S5=A1    :REM ADDR C'S LSB    OI
•3500 S6=A2: S7=A3    :REM C'S MSB         NE
•3530 REM CLC, LDA B(LSB), ADC C(LSB),STA
 A(LSB)                                    DJ
•3535 REM LDA B(MSB), ADC C(MSB), STA A(M
 SB)                                       MP
•3540 N=19: C(1)=24: C(2)=173: C(3)=S0: C
 (4)=S1                                    LD
•3550 C(5)=109: C(6)=S4: C(7)=S5: C(8)=14
 1: C(9)=D0: C(10)=D1                      HD
•3560 C(11)=173: C(12)=S2: C(13)=S3: C(14
 )=109: C(15)=S6: C(16)=S7                 PK
```

```
•3570 C(17)=141: C(18)=D2: C(19)=D3          DI
•3580 GOSUB 1500                              GA
•3590 RETURN                                  KC
•3600 REM <<< A=B >>>                         MJ
•3610 REM LDA B(LSB), STA A(LSB), LDA B(M
 SB), STA A(MSB)                              MG
•3620 N=12: C(1)=173: C(2)=S0: C(3)=S1: C
 (4)=141: C(5)=D0: C(6)=D1                    IB
•3630 C(7)=173: C(8)=S2: C(9)=S3: C(10)=1
 41: C(11)=D2: C(12)=D3                       GC
•3640 GOSUB 1500                              JJ
•3650 RETURN                                  NO
•4000 REM <<<  IF A=B THEN MM  >>>            KG
•4010 GOSUB 1100  :REM 'A                     EL
•4020 GOSUB 1300: IF VT<>1 THEN EC=65:
 GOSUB 10000: STOP                            IB
•4030 S0=A0: S1=A1: S2=A2: S3=A3              OK
•4040 GOSUB 1100: IF C<>178 THEN EC=178:
 GOSUB 10000: STOP   :REM '=                  IK
•4050 GOSUB 1100       :REM 'B                FC
•4060 GOSUB 1300: IF VT<>1 THEN EC=65:
 GOSUB 10000: STOP                            KJ
•4070 GOSUB 1100       :REM 'THEN             FE
•4080 IF C<>167 THEN EC=167: GOSUB 10000:
 STOP                                         GL
•4090 C$=""                                   GE
•4100 GOSUB 1100: IF C=0 THEN 4120   :REM
 GET MM                                       EI
•4110 C$=C$+CHR$(C): GOTO 4100                BA
•4120 MM=VAL(C$)                              OI
•4130 IF MM<0 OR MM>999 THEN EC=1:  GOSUB
 10000: STOP                                  HK
•4140 JI=JI+1         :REM JUMP TABLE INDEX   OL
•4150 JT(JI,0)=LN    :REM CURRENT LINE #      ML
•4160 JT(JI,1)=MM    :REM TARGET LINE #       EB
•4170 JT(JI,2)=CM+17    :REM MEM LOC AFTER
 'JMP                                         FB
•4180 REM  LDA A(MSB), CMP B(MSB), BNE EX
 IT,                                          OC
•4185 REM  LDA A(LSB), CMP B(LSB), BNE EX
 IT, JMP MM                                   KA
•4190 N=19: C(1)=173: C(2)=S2: C(3)=S3        GK
•4200 C(4)=205: C(5)=A2: C(6)=A3              JG
•4210 C(7)=208: C(8)=11: C(9)=173: C(10)=
 S0: C(11)=S1                                 CE
•4220 C(12)=205: C(13)=A0: C(14)=A1           GB
•4230 C(15)=208: C(16)=3: C(17)=76: C(18)
 =0: C(19)=0                                  OA
•4240 GOSUB 1500                              PD
•4250 RETURN                                  DI
•5000 REM <<< GOTO MM >>>                     GB
•5010 C$=""                                   AA
•5020 GOSUB 1100: REM GET DIGITS OF MM        IB
•5030 IF C=0 THEN 5060                        MP
•5040 C$=C$+CHR$(C)                           HG
•5050 GOTO 5020                               BJ
•5060 MM=VAL(C$)                              IN
•5070 IF MM<0 OR MM>999 THEN EC=1:  GOSUB
 10000: STOP                                  NJ
•5080 JI=JI+1       :REM JUMP TABLE INDEX     IA
•5085 JT(JI,0)=LN   :REM SOURCE LINE#         CG
•5090 JT(JI,1)=MM   :REM TARGET LINE#         MM
•5100 JT(JI,2)=CM+1 :REM OBJ MEM LOCATION
 AFTER 'JMP'                                  NC
•5110 REM  JMP MM                             BP
•5120 N=3: C(1)=76: C(2)=0: C(3)=0            FO
•5130 GOSUB 1500                              HB
•5140 RETURN                                  LG
•6000 REM <<< PRINT, PRINT A[;], OR PRINT
 CHR$(A)[;] >>>                               NH
•6010 GOSUB 1100: IF C=199 THEN 6300 :REM
 'CHR$                                        NL
•6020 IF C=0 THEN PC=13: GOSUB 6200: RETU
 RN:  REM 'PRINT                              KP
•6030 GOSUB 1300: IF VT=2 THEN 9700           JL
•6035 IF VT<>1 THEN EC=65: GOSUB 10000: S
 TOP                                          FE
•6040 REM <<< PRINT A >>>                     HK
•6050 REM   LDX $A(MSB), LDY $A(LSB), JSR
 $C0E0                                        FM
•6060 PRINT: N=9: C(1)=174: C(2)=A0: C(3)
 =A1                                          AK
•6070 C(4)=172: C(5)=A2: C(6)=A3              BA
•6080 C(7)=32: C(8)=224: C(9)=192             DE
•6090 GOSUB 1500                              DI
•6095 PC=32: GOSUB 6200    :REM ADD SPACE
 AFTER  DIGITS                                KK
•6100 GOSUB 1100: IF C=0 THEN PC=13: GOSU
 B 6200: RETURN   :REM PRINT CR               PO
•6110 IF C<>59 THEN EC=59: GOSUB 10000:
 STOP  :REM  ' ;                              KL
•6120 GOSUB 1100: IF C>0 THEN EC=0: GOSUB
 10000: STOP                                  EN
•6130 RETURN                                  JH
•6200 REM --- PRINT CHARACTER PC ---          HF
•6210 REM LDA #PC, JSR $FFD2                  JI
•6220 PRINT:N=5: C(1)=169: C(2)=PC: C(3)=
 32                                           PG
•6230 C(4)=210: C(5)=255: GOSUB 1500          DG
•6240 RETURN                                  AG
•6300 REM <<< PRINT CHR$(A) [;] >>>           MA
•6310 GOSUB 1100: IF C<>40 THEN EC=40: GO
 SUB 10000: STOP :REM  '(                     HP
•6320 GOSUB 1100: GOSUB 1300: IF VT<>1 TH
 EN EC=65: GOSUB 10000: STOP                  AI
•6330 REM    LDA A(LSB), JSR $FFD2            OL
•6340 PRINT: N=6: C(1)=173: C(2)=A0: C(3)
 =A1                                          HD
•6350 C(4)=32: C(5)=210: C(6)=255             NP
•6360 GOSUB 1500                              ED
•6370 GOSUB 1100: IF C<>41 THEN EC=41: GO
 SUB 10000: STOP  : REM ')                    NO
•6380 GOSUB 1100: IF C>0 THEN 6400            JO
•6390 PRINT: PC=13: GOSUB 6200: RETURN        NG
•6400 IF C<>59 THEN EC=59: GOSUB 10000:
 STOP  :REM ';                                HP
```

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•6410 GOSUB 1100: IF C<>0 THEN EC=0:GOSUB
 10000: STOP                                PP
•6420 RETURN                                LL
•7000 REM <<< END >>>                       EL
•7005 REM    RTS                            AJ
•7010 N=1: C(1)=96: GOSUB 1500              IH
•7020 GOSUB 1100: IF C<>0 THEN EC=0:GOSUB
 10000: STOP                                DD
•7030 RETURN                                BP
•8000 REM <<< REM >>>                       DE
•8010 GOSUB 1100: IF C>0 THEN 8010          PA
•8020 RETURN                                AB
•8999 REM << STRINGS >>                     NC
•9000 REM <<  STRING VARIABLES  >>          HN
•9010 GOSUB 1600 :D0=NL: D1=NH: REM GET D
EST VAR ADDR                                IH
•9020 GOSUB 1100: IF C<>178 THEN EC=178:
EC$=" = ": GOSUB 10000: STOP                MP
•9030 GOSUB 1100                            LM
•9040 GOSUB 1300: IF VT=2 THEN 9400 :REM
A$=B$...                                    LA
•9050 IF C=34 THEN 9200  :REM '"LITERAL"    MN
•9060 IF C<>199 THEN EC=199: EC$="CHR$":
GOSUB 10000: STOP                           DD
•9100 REM << A$=CHR$(N) >>                  HD
•9110 GOSUB 1100: IF C<>40 THEN EC=40: EC
$="(": GOSUB 10000: STOP                    NG
•9120 GOSUB 1100: GOSUB 1300: IF VT<>1 TH
EN EC=65: GOSUB 10000: STOP                 EP
•9130 GOSUB 1100: IF C<>41 THEN EC=41: EC
$=")": GOSUB 10000: STOP                    OD
•9140 GOSUB 1100: IF C>0 THEN EC=0: GOSUB
 10000: STOP                                DF
•9150 REM  LDA #1; STA A$; LDA N.LSB; LDY
 #1; STA A$,Y                               PE
•9160 N=13: C(1)=169: C(2)=1: C(3)=141: C
(4)=D0: C(5)=D1: C(6)=173                   DL
•9170 C(7)=A0: C(8)=A1: C(9)=160: C(10)=1
: C(11)=153: C(12)=D0                       BM
•9180 C(13)=D1: GOSUB 1500: RETURN          KG
•9200 REM << A$=" LITERAL " >>              KE
•9205 NC=0  :REM STORE # OF CHARS           NN
•9210 GOSUB 1100: IF C=34 THEN 9250         EH
•9220 NC=NC+1: IF NC=256 THEN PRINT"STRIN
G TOO LONG": STOP                           KC
•9230 S(NC)=C                               FF
•9240 GOTO 9210                             JB
•9250 GOSUB 1100: IF C<>0 THEN EC=0: GOSU
B 10000: STOP                               IO
•9260 REM LDA # NC: STA A$: LDY #1          FJ
•9265 REM ..FOR K=1 TO NC: LDA # S(K): ST
A A$,Y: INY: NEXT K..                       BP
•9270 N=7: C(1)=169: C(2)=NC: C(3)=141: C
(4)=D0: C(5)=D1: C(6)=160: C(7)=1           BB
•9280 GOSUB 1500                            LH
•9290 N=6: FOR K=1 TO NC: C(1)=169: C(2)=
S(K): C(3)=153: C(4)=D0: C(5)=D1            OJ
•9295 C(6)=200: GOSUB 1500: NEXT K : RETU
RN                                          AK
•9400 REM <<  A$=B$ ... >>                  PF
•9410 GOSUB 1600: S0=NL: S1=NH  :REM B$ A
DDR                                         JB
•9420 GOSUB 1100: IF C=170 THEN 9500  :RE
M '+                                        CN
•9430 IF C>0 THEN EC=0: GOSUB 10000: STOP DM
•9440 REM  LDX B$: LDY #0; LOOP: LDA B$,Y
; STA A$,Y; INY; BPL LOOP                   LB
•9450 N=15: C(1)=174: C(2)=S0: C(3)=S1: C
(4)=160: C(5)=0: C(6)=185: C(7)=S0          DH
•9460 C(8)=S1: C(9)=153: C(10)=D0: C(11)=
D1: C(12)=200: C(13)=202                    NH
•9470 C(14)=16: C(15)=246: GOSUB 1500: RE
TURN                                        AN
•9500 REM <<  A$=B$ + C$ >>                 GG
•9510 GOSUB 1100: GOSUB 1300: IF VT<>2 TH
EN EC=65: GOSUB 10000: STOP                 KK
•9520 GOSUB 1600: S2=NL: S3=NH :REM C$ AD
DR                                          EJ
•9530 GOSUB 1100: IF C>0 THEN EC=0: GOSUB
 10000: STOP                                KN
•9535 GOSUB 9450: REM A$=B$                 JB
•9540 N=53: C(1)=169: C(2)=D0: C(3)=133:
C(4)=253: C(5)=169: C(6)=D1                 MJ
•9545 C(7)=133: C(8)=254: C(9)=173: C(10)
=S0: C(11)=S1: C(12)=24: C(13)=101          NF
•9550 C(14)=253: C(15)=133: C(16)=253: C(
17)=169: C(18)=0: C(19)=101                 KL
•9555 C(20)=254: C(21)=133: C(22)=254: C(
23)=174: C(24)=S2: C(25)=S3                 BF
•9560 C(26)=160: C(27)=1: C(28)=185: C(29
)=S2: C(30)=S3: C(31)=145                   IM
•9565 C(32)=253: C(33)=200: C(34)=170: C(
35)=208: C(36)=247: C(37)=173               HK
•9570 C(38)=S0: C(39)=S1: C(40)=24: C(41)
=109: C(42)=S2: C(43)=S3                    JA
•9575 C(44)=144: C(45)=5: C(46)=162: C(47
)=23: C(48)=108: C(49)=0                    KA
•9580 C(50)=3: C(51)=141: C(52)=D0: C(53)
=D1                                         MI
•9590 GOSUB 1500: RETURN                    KP
•9700 REM << PRINT A$ >>                    JH
•9710 GOSUB 1600: S0=NL: S1=NH              JK
•9720 REM  LDX LEN(A$); LDY #1; LOOP:  LD
A A$,Y; JSR $FFD2; INY; DEX; BNE LOOP       AH
•9730 N=15: C(1)=174: C(2)=S0: C(3)=S1: C
(4)=160: C(5)=1: C(6)=185                   AK
•9740 C(7)=S0: C(8)=S1: C(9)=32: C(10)=21
0: C(11)=255: C(12)=200                     AF
•9750 C(13)=202: C(14)=208: C(15)=246: GO
SUB 1500                                    EF
•9760 GOSUB 1100: IF C=0 THEN PC=13: GOSU
B 6200: RETURN                              CF
•9770 IF C<>59 THEN EC=59: EC$=";": GOSUB
 10000: STOP                                DK
•9780 GOSUB 1100: IF C>0 THEN EC=0: GOSUB
 10000: STOP                                JK
```

```
•9790 RETURN                                          PC
•10000 PRINT:PRINT"[RVSON]SYNTAX ERROR IN
 LINE[RVSOFF]";LN                                     MC
•10010 IF EC=0 THEN PRINT"EXPECTED END-OF
-LINE NOT FOUND":RETURN                               AN
•10020 IF EC=1 THEN PRINT"INVALID LINE NU
MBER":RETURN                                          AJ
•10030 IF EC=48 THEN PRINT"NUMERIC VALUE
0-9 EXPECTED": RETURN                                 DO
•10040 IF EC=65 THEN PRINT"VARIABLE A-Z E
XPECTED": RETURN                                      PD
•10050 IF EC>127 THEN PRINT"EXPECTED BASI
C KEYWORD ";EC$: RETURN                               NI
•10060 PRINT"EXPECTED CHARACTER[3" "]";CH
R$(EC);"[3" "]WITH ASCII VALUE"EC :RETUR
N                                                     MA
•11000 REM -- PUT M.L. PRINT ROUTINE INTO
 MEMORY --                                            CB
•11010 M=49376  :REM $C0E0                            OM
•11020 CS=3319 :REM CHECKSUM                          FB
•11030 READ B: IF B<0 THEN 11060                      HD
•11040 POKE M,B: M=M+1: CK=CK+B                       OM
•11050 GOTO 11030                                     NB
•11060 IF CK<>CS THEN PRINT"ERROR IN DATA
 STATEMENTS STARTING AT [3"1"]20":STOP                JK
•11070 RETURN                                         PH
•11080 DATA 169, 32, 200, 136, 16, 2                  PD
•11090 DATA 169, 45, 32, 210, 255, 152, 1
6, 12                                                 LC
•11100 DATA 138, 73, 255, 24, 105, 1, 170
, 152                                                 LM
•11110 DATA 73, 255, 105, 0, 32, 205, 189
, 96                                                  MI
•11120 DATA -1                                        IB
```

ISLAND QUEST

FROM PAGE 15

Starting address in hex: C000
Ending address in hex: CC6F
SYS to start: 49152

Flankspeed **required for entry! See page 59.**

```
C000: 20 50 C6 20 2F C4 20 1A 85
C008: C7 A9 00 8D 0B DC 8D 0A 86
C010: DC 8D 09 DC A9 0D 8D 62 07
C018: C0 A9 CC 8D 63 C0 20 5F 80
C020: C0 20 72 C0 20 D8 C8 20 16
C028: E3 C9 20 7B C9 A9 28 8D 9A
C030: FF C0 A9 00 8D 08 DC 20 2D
C038: 87 C2 AD 61 CC F0 06 20 75
C040: 72 C0 4C 03 C0 20 35 C2 9B
C048: 20 86 C0 20 08 C1 20 5E 18
C050: C1 20 3A C3 20 64 C3 AD 26
C058: 54 CC F0 DB 4C D8 C0 A2 CE
C060: 00 BD 00 10 9D 01 07 A9 7D
C068: 03 9D 01 DB E8 E0 16 D0 96
C070: F0 60 AD 00 DC C9 6F D0 56
C078: F9 A2 00 A9 20 9D 01 07 84
C080: E8 E0 16 D0 F6 60 AD 09 3F
C088: DC 29 0F 8D 5C CC C9 00 1E
C090: D0 04 8D 8F C0 60 8D 8F C0
C098: C0 EE 2D 05 AD 2D 05 C9 24
C0A0: 3A F0 01 60 A9 30 8D 2D C1
C0A8: 05 EE 2C 05 AD 2C 05 C9 76
C0B0: 36 F0 01 60 A9 30 8D 2C CC
C0B8: 05 EE 2A 05 AD 2A 05 C9 82
C0C0: 3A F0 01 60 A9 30 8D 2A DE
C0C8: 05 EE 29 05 AD 29 05 C9 90
C0D0: 36 F0 01 60 EE 54 CC 60 C9
C0D8: A9 30 8D 29 05 A9 23 8D C8
C0E0: 62 C0 A9 CC 8D 63 C0 20 4C
C0E8: 5F C0 20 72 C0 4C 03 C0 6C
C0F0: EE 62 CC AD 62 CC D0 F8 B5
C0F8: EE 63 CC AD 63 CC C9 16 D5
C100: D0 EE A9 00 8D 63 CC 60 87
C108: A9 01 8D 42 D9 20 F0 C0 2E
C110: A9 00 8D 42 D9 60 AE 57 C9
C118: CC BD BF CA 8D 2E C1 BD 68
C120: C5 CA 8D 2F C1 AC 5F CC 08
C128: A2 00 B9 AD CA 9D 00 04 9E
C130: C8 E8 E0 03 D0 F4 8C 5F 77
C138: CC EE 57 CC 60 AE 56 CC 4A
C140: BD CB CA 8D 52 C1 BD C5 B9
C148: CA 8D 53 C1 A0 65 A2 00 5E
C150: 98 9D 00 04 C8 E8 E0 02 1F
C158: D0 F6 EE 56 CC 60 AD 66 A6
C160: CC C9 FF D0 1F 38 AD 0B D7
C168: C1 E9 01 8D 0B C1 8D 13 10
C170: C1 90 03 4C 7C C1 CE 0C 2B
C178: C1 CE 14 C1 A9 0B 8D 66 87
C180: CC 4C A4 C1 C9 0C D0 1C C2
C188: 18 AD 0B C1 69 01 8D 0B 1E
C190: C1 8D 13 C1 B0 03 4C 9F 54
C198: C1 EE 0C C1 EE 14 C1 A9 85
C1A0: 00 8D 66 CC AD 67 CC C9 0D
C1A8: FF D0 1D 38 AD 0B C1 E9 33
C1B0: 28 8D 0B C1 8D 13 C1 90 26
C1B8: 03 4C C2 C1 CE 0C C1 CE F7
C1C0: 14 C1 A9 0B 8D 67 CC 60 6D
C1C8: C9 0C D0 1C 18 AD 0B C1 1E
C1D0: 69 28 8D 0B C1 8D 13 C1 1F
C1D8: B0 03 4C E3 C1 EE 0C C1 3B
C1E0: EE 14 C1 A9 00 8D 67 CC 11
C1E8: 60 A0 00 A9 41 8D 04 D4 3B
C1F0: 8D 0B D4 AE 55 CC BD EF DC
C1F8: CA AA BD D1 CA 8D 00 D4 2B
C200: BD E0 CA 8D 01 D4 AE 55 D0
C208: CC BD 2F CB AA BD D1 CA 92
C210: 8D 07 D4 BD E0 CA 8D 08 78
C218: D4 20 F0 C0 A9 41 8D 04 3B
C220: D4 8D 0B D4 EE 55 CC C8 3C
C228: C0 10 D0 BF A9 40 8D 04 05
C230: D4 8D 0B D4 60 AD 64 CC B1
C238: 85 FB A9 60 85 FC AE 65 5A
C240: CC E0 00 F0 10 A5 FB 18 A8
```

```
C248: 69 80 85 FB A5 FC 69 00 BF
C250: 85 FC CA D0 F0 A9 77 85 06
C258: 02 A9 05 85 03 A2 06 A0 DA
C260: 08 B1 FB 91 02 88 10 F9 3C
C268: 18 A5 02 69 28 85 02 A5 E6
C270: 03 69 00 85 03 18 A5 FB 1F
C278: 69 80 85 FB A5 FC 69 00 EF
C280: 85 FC CA 10 DA 60 60 AD 27
C288: 00 DC C9 7F F0 F8 8D 5D 83
C290: CC 29 04 D0 10 AD 64 CC 4A
C298: C9 05 F0 EA CE 64 CC CE 12
C2A0: 66 CC 20 F6 C2 AD 5D CC 85
C2A8: 29 08 D0 10 AD 64 CC C9 63
C2B0: 72 F0 D3 EE 64 CC EE 66 5D
C2B8: CC 20 06 C3 AD 5D CC 29 70
C2C0: 01 D0 10 AD 65 CC C9 06 52
C2C8: F0 20 CE 65 CC CE 67 CC DD
C2D0: 20 16 C3 AD 5D CC 29 02 CD
C2D8: D0 10 AD 65 CC C9 73 F0 C7
C2E0: 09 EE 65 CC EE 67 CC 20 4E
C2E8: 26 C3 AD 5D CC 29 10 D0 B4
C2F0: 04 20 F2 C3 60 60 38 AD 72
C2F8: 37 C3 E9 01 8D 37 C3 90 F7
C300: 01 60 CE 38 C3 60 18 AD 52
C308: 37 C3 69 01 8D 37 C3 B0 A6
C310: 01 60 EE 38 C3 60 38 AD A2
C318: 37 C3 E9 80 8D 37 C3 90 96
C320: 01 60 CE 38 C3 60 18 AD 72
C328: 37 C3 69 80 8D 37 C3 B0 46
C330: 01 60 EE 38 C3 60 8D 89 F3
C338: 64 60 20 E4 FF C9 44 F0 01
C340: 01 60 AD 37 C3 8D 4F C3 EA
C348: AD 38 C3 8D 50 C3 AD 00 41
C350: 60 8D 60 CC C9 6A 90 E9 1A
C358: A9 68 20 36 C3 20 35 C2 9C
C360: 20 99 C3 60 AD 37 C3 8D 74
C368: 71 C3 AD 38 C3 8D 72 C3 0B
C370: AD 00 60 C9 67 F0 01 60 02
C378: A9 62 20 36 C3 20 16 C1 96
C380: A9 B5 8D 62 C0 A9 CB 8D 93
C388: 63 C0 20 5F C0 A9 00 8D 24
C390: 55 CC 20 E9 C1 20 72 C0 D1
C398: 60 AD 60 CC C9 71 B0 41 01
C3A0: AD 60 CC C9 6A D0 1E A9 48
C3A8: CB 8D 62 C0 A9 CB 8D 63 8B
C3B0: C0 A9 69 20 36 C3 20 5F 1E
C3B8: C0 A9 30 8D 55 CC 20 E9 0D
C3C0: C1 20 72 C0 60 A9 89 8D F6
C3C8: 62 C0 A9 CB 8D 63 C0 20 33
C3D0: 3D C1 20 5F C0 A9 20 8D 67
C3D8: 55 CC 20 E9 C1 20 72 C0 1A
C3E0: 60 A9 9F 8D 62 C0 A9 CB B0
C3E8: 8D 63 C0 20 5F C0 20 72 6D
C3F0: C0 60 AD 56 CC C9 06 D0 83
C3F8: F8 AD 37 C3 8D 06 C4 AD A0
C400: 38 C3 8D 07 C4 AD 00 60 63
C408: C9 69 D0 E5 EE 61 CC A9 B8
C410: E1 8D 62 C0 A9 CB 8D 63 09
```

```
C418: C0 20 5F C0 A9 00 8D 55 A5
C420: CC A9 40 8D 29 C2 20 E9 5A
C428: C1 A9 10 8D 29 C2 60 A2 20
C430: 00 8A 9D 00 38 9D 00 39 67
C438: E8 E0 00 D0 F5 A2 00 BD 29
C440: 54 C5 9D 00 38 BD 93 C5 47
C448: 9D 40 38 BD D2 C5 9D 80 D2
C450: 38 BD 11 C6 9D C0 38 E8 9D
C458: E0 40 D0 E3 A2 00 A0 00 71
C460: BD 4D CC 99 00 39 C8 C8 9C
C468: C8 E8 E0 07 D0 F2 A2 00 68
C470: BD 28 C5 9D 00 D0 E8 E0 54
C478: 2C D0 F5 A9 89 8D 37 C3 27
C480: A9 64 8D 38 C3 A2 00 BD 78
C488: 0F C5 9D 00 D4 E8 E0 19 B2
C490: D0 F5 A2 00 A0 E0 98 9D B1
C498: F8 07 C8 E8 E0 06 D0 F6 F8
C4A0: A0 00 A2 00 BD 76 CB 99 7D
C4A8: 40 CF C8 E8 E0 0A D0 F4 1B
C4B0: C0 32 D0 EE A9 12 8D BE 6B
C4B8: C4 A0 00 A2 00 A9 12 99 16
C4C0: 00 CF C8 E8 E0 05 D0 F5 EE
C4C8: 18 AD BE C4 69 0A 8D BE D1
C4D0: C4 AD BE C4 C9 76 D0 E3 BB
C4D8: A2 00 A9 32 9D 39 CC E8 E3
C4E0: E0 14 D0 F8 A2 00 8A 9D 6A
C4E8: 54 CC E8 E0 10 D0 F8 A0 4E
C4F0: 05 8C 64 CC 8C 66 CC 8C FF
C4F8: 67 CC C8 8C 65 CC A9 42 A0
C500: 8D 0B C1 8D 13 C1 A9 D9 40
C508: 8D 0C C1 8D 14 C1 60 00 27
C510: 00 00 08 00 00 F8 00 00 11
C518: 00 08 00 00 F8 FF FF 00 19
C520: 00 80 80 80 00 00 00 8F 31
C528: 88 73 B0 73 B0 93 88 93 A8
C530: B0 93 00 00 00 00 00 00 74
C538: 00 1B 00 00 00 1F D8 0F 5A
C540: 1D 00 00 00 00 0F 00 00 6C
C548: 00 0B 09 0E 01 09 07 00 7B
C550: 00 00 00 06 FF FF FF FF 56
C558: FF FF FF FF FF FF FF FF 58
C560: FF FF FF FF FF 00 FF FE 5F
C568: 00 FF FC 00 FF F8 00 FF 5E
C570: F0 00 FF E0 00 FF C0 00 03
C578: FF 80 00 FF 00 00 FE 00 F7
C580: 00 FE 00 00 FE 00 00 FE 7D
C588: 00 00 FE 00 00 FE 00 00 86
C590: FE 00 00 FF FF FF FF FF 8F
C598: FF FF FF FF FF FF FF FF 98
C5A0: FF FF 00 FF FF 00 7F FF 20
C5A8: 00 3F FF 00 1F FF 00 0F 16
C5B0: FF 00 07 FF 00 03 FF 00 BA
C5B8: 01 FF 00 00 FF 00 00 7F 39
C5C0: 00 00 7F 00 00 7F 00 00 BF
C5C8: 7F 00 00 7F 00 00 7F 00 47
C5D0: 00 7F 00 00 7F 00 00 7F 4F
C5D8: 00 00 7F 00 00 7F 00 00 D7
C5E0: 7F 00 00 FF 00 01 FF 00 61
```

```
C5E8: 03 FF 00 07 FF 00 0F FF 02
C5F0: 00 1F FF 00 3F FF 00 7F CE
C5F8: FF 00 FF FF FF FF FF FF F8
C600: FF FF FF FF FF FF FF FF FF
C608: FF FF FF FF FF FF FF FF 08
C610: FF FE 00 00 FE 00 00 FE 0D
C618: 00 00 FE 00 00 FE 00 00 16
C620: FF 00 00 FF 80 00 FF C0 61
C628: 00 FF E0 00 FF F0 00 FF F9
C630: F8 00 FF FC 00 FF FE 00 25
C638: FF FF 00 FF FF FF FF FF 38
C640: FF FF FF FF FF FF FF FF 40
C648: FF FF FF FF FF FF FF FF 48
C650: AD 0E DC 29 FE 8D 0E DC 89
C658: A5 01 29 FB 85 01 A2 00 4D
C660: BD 00 D0 9D 00 30 E8 E0 86
C668: 00 D0 F5 EE 62 C6 EE 65 9B
C670: C6 AD 65 C6 C9 37 D0 E6 C9
C678: A9 30 8D 65 C6 A9 D0 8D 14
C680: 62 C6 A5 01 09 04 85 01 E3
C688: AD 0E DC 09 01 8D 0E DC A3
C690: A2 00 BD AA C6 9D E0 32 13
C698: E8 E0 70 D0 F5 A2 00 A9 E5
C6A0: FF 9D 50 33 E8 E0 68 D0 C4
C6A8: F8 60 FF FF BF BF BF AF F0
C6B0: AB AA FF FF FE FE FE FA FE
C6B8: EA AA FF FF FF FF FB AB F5
C6C0: AA AA AA AB AF BF BF BF 5B
C6C8: FF FF AA FA FE FF FF FF 6D
C6D0: FF FF AA AA AB FB FF FF CD
C6D8: FF FF AA AA AA AA AA AA D8
C6E0: AA AA AA AA AA BA AA AA 46
C6E8: AA AA AA AA AA AA AB AA 3F
C6F0: AA AA 01 07 1F 15 1F 1D BE
C6F8: 1F 1F 50 74 7D 55 7D DD 2A
C700: 7D FD A6 AE AE AE BF B7 A5
C708: AA AA FF FF 57 D5 55 57 37
C710: D5 FF 6A 59 A6 59 AA 7F D3
C718: 7F 7F A9 9B 20 D2 FF A9 F8
C720: 93 20 D2 FF A2 00 A9 43 36
C728: 9D F0 04 9D D0 06 9D A0 6D
C730: 04 9D 20 07 A9 01 9D F0 32
C738: D8 9D D0 DA 9D A0 D8 9D 0F
C740: 20 DB BD 6E CA 9D C8 04 9D
C748: A9 03 9D C8 D8 9D F8 DA A5
C750: E8 E0 28 D0 D1 A2 00 BD 45
C758: 63 CA 9D 29 05 A9 01 9D 9A
C760: 29 D9 E8 E0 05 D0 F0 A2 96
C768: 00 BD 96 CA 9D 08 04 A9 DA
C770: 01 9D 08 D8 E8 E0 17 D0 A1
C778: F0 A9 00 8D 58 CC AE 58 CC
C780: CC BD BF CA 8D A8 C7 8D 21
C788: B3 C7 BD CB CA 8D AE C7 5C
C790: BD C5 CA 8D A9 C7 8D AF 1B
C798: C7 18 AD AF C7 69 D4 8D 69
C7A0: B4 C7 A0 00 B9 68 CA 99 44
C7A8: 00 04 B9 6B CA 99 00 04 3A
C7B0: A9 05 99 00 D4 C8 C0 03 5A
```

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C7B8: D0 EA EE 58 CC AD 58 CC 5B
C7C0: C9 06 D0 BA A2 00 A0 81 E0
C7C8: 98 9D 1A 05 A9 07 9D 1A 86
C7D0: D9 C8 E8 E0 0A D0 F1 A9 B3
C7D8: 90 20 D2 FF A9 02 8D E4 7A
C7E0: C7 A2 08 A0 02 18 20 F0 1F
C7E8: FF A9 71 20 D2 FF E8 E0 C0
C7F0: 12 D0 F2 EE E4 C7 AD E4 F4
C7F8: C7 C9 0C D0 E4 A9 9E 20 B4
C800: D2 FF A9 12 20 D2 FF A9 2B
C808: 30 8D 15 C8 A2 08 A0 01 EF
C810: 18 20 F0 FF A9 30 20 D2 06
C818: FF EE 15 C8 E8 E0 12 D0 91
C820: EF A9 92 20 D2 FF A9 F7 E0
C828: 8D 62 C0 A9 CB 8D 63 C0 FF
C830: 20 5F C0 A9 01 8D FF C0 69
C838: A2 00 20 46 CA 18 AD 5E 30
C840: CC 69 62 9D 00 60 E8 E0 A0
C848: 00 D0 EF EE 45 C8 AD 45 F8
C850: C8 C9 A0 D0 E3 A9 60 8D CF
C858: 45 C8 A2 00 18 20 F0 C0 F2
C860: 20 46 CA 18 AD 5E CC 69 EB
C868: 5C 9D 09 64 20 46 CA 18 19
C870: AD 5E CC 69 5F 9D 89 9B D4
C878: E8 E0 6E D0 E0 A2 00 A9 AE
C880: A0 9D 00 60 9D 00 61 9D BB
C888: 00 62 9D 00 63 9D 00 9C 26
C890: E8 E0 00 D0 EA A9 00 8D 4D
C898: 58 CC A9 00 8D 59 CC AE C9
C8A0: 58 CC BD 6F CB 8D B0 C8 C5
C8A8: A9 64 8D B1 C8 A9 A0 8D 96
C8B0: 00 60 18 AD B0 C8 69 80 3A
C8B8: 8D B0 C8 B0 03 4C C3 C8 4C
C8C0: EE B1 C8 EE 59 CC AD 59 46
C8C8: CC C9 70 D0 E0 EE 58 CC 95
C8D0: AD 58 CC C9 07 D0 C3 60 69
C8D8: A9 00 8D 58 CC AD 1B D4 D2
C8E0: C9 32 B0 F9 8D 5E CC A2 E2
C8E8: 00 BD 39 CC CD 5E CC F0 96
C8F0: EC E8 E0 13 D0 F3 AE 58 86
C8F8: CC AD 5E CC 9D 39 CC EE 31
C900: 58 CC AD 58 CC C9 13 D0 A5
C908: D4 A9 01 8D 58 CC AE 58 41
C910: CC BD 39 CC AA BD 00 CF D8
C918: A2 00 A8 38 98 E9 0A A8 D0
C920: E8 C0 08 D0 F6 18 8A 69 A5
C928: 2F 8D AD CA AE 58 CC BD EE
C930: 39 CC AA BD 40 CF A2 00 51
C938: A8 38 98 E9 0A A8 E8 C0 F7
C940: 08 D0 F6 18 8A 8D AF CA BA
C948: EE 2A C9 EE 2A C9 EE 2A 27
C950: C9 EE 46 C9 EE 46 C9 EE 07
C958: 46 C9 EE 58 CC AD 58 CC 4F
C960: C9 07 D0 AA A9 AD 8D 2A BB
C968: C9 8D 46 C9 A9 CA 8D 2B FC
C970: C9 8D 47 C9 EE 2A C9 EE AA
C978: 2A C9 60 A9 0D 8D 58 CC 36
C980: 20 93 C9 A9 67 20 DF C9 D8
```

IMPORTANT! Letters on white background are **Bug Repellent** line codes. **Do not enter them!** Pages 57 and 58 explain these codes and provide other essential information on entering ***Ahoy!*** programs. Refer to these pages **before** entering any programs!

```
C988: EE 58 CC AD 58 CC C9 13 4C
C990: D0 EE 60 A9 00 8D E0 C9 92
C998: A9 60 8D E1 C9 AE 58 CC AF
C9A0: BD 39 CC AA BD 00 CF 8D 2A
C9A8: 59 CC 18 AD E0 C9 69 80 29
C9B0: 8D E0 C9 B0 03 4C BB C9 6E
C9B8: EE E1 C9 CE 59 CC AD 59 4F
C9C0: CC D0 E7 AE 58 CC BD 39 11
C9C8: CC AA 18 AD E0 C9 7D 40 6E
C9D0: CF 8D E0 C9 B0 03 4C DC B5
C9D8: C9 EE E1 C9 A9 67 60 8D 3C
C9E0: 00 60 60 A9 00 8D 58 CC FD
C9E8: A9 6A 8D 84 CB A9 00 8D 12
C9F0: 5B CC 20 93 C9 AD E0 C9 EE
C9F8: 8D 0F CA AD E1 C9 8D 10 57
CA00: CA A9 00 8D 5A CC AE 5B 33
CA08: CC A0 00 BD 80 CB 99 00 19
CA10: 60 E8 8E 5B CC C8 C0 03 9C
CA18: D0 F1 EE 5A CC AD 5A CC C5
CA20: C9 03 D0 0E EE 84 CB EE F9
CA28: 58 CC AD 58 CC C9 0D D0 C7
CA30: BC 60 18 AD 0F CA 69 80 D6
CA38: 8D 0F CA B0 03 4C 06 CA 70
CA40: EE 10 CA 4C 06 CA AD 1B EF
CA48: D4 C9 55 B0 06 A9 00 8D 2A
CA50: 5E CC 60 C9 AA B0 06 A9 B0
CA58: 01 8D 5E CC 60 A9 02 8D AB
CA60: 5E CC 60 30 30 3A 30 30 E6
CA68: A0 A0 A0 A0 A0 20 20 20 EB
CA70: 13 05 03 14 0F 12 20 0D ED
CA78: 01 10 20 20 20 14 09 0D 14
CA80: 05 2F 16 09 05 17 20 20 30
CA88: 20 03 0C 15 05 13 20 20 25
CA90: 02 0F 0F 14 19 20 09 20 27
CA98: 13 20 0C 20 01 20 0E 20 47
CAA0: 04 20 20 20 11 20 15 20 6B
CAA8: 05 20 13 20 14 30 2D 01 73
CAB0: 30 2D 01 30 2D 01 30 2D CA
CAB8: 01 30 2D 01 30 2D 01 34 AA
CAC0: 84 D4 24 74 C4 05 05 05 86
CAC8: 06 06 06 3B 8B DB 2B 7B 24
CAD0: CB 00 0C E9 61 68 8F 30 1C
CAD8: 8F 18 D2 C3 D1 1F 60 1E 86
CAE0: 00 07 07 08 09 0A 0B 0C 21
CAE8: 0E 0F 10 12 15 16 19 05 71
CAF0: 08 05 08 05 06 05 04 06 20
CAF8: 05 04 03 02 04 02 01 05 13
CB00: 08 05 08 05 06 05 04 06 2F
CB08: 05 04 03 02 04 02 01 00 1D
CB10: 0C 00 0E 0E 0D 0C 0D 00 5E
CB18: 0B 00 0D 0D 0C 0B 0C 00 60
CB20: 05 07 09 0B 0C 0A 0B 09 6A
CB28: 0A 08 09 07 08 09 08 05 68
CB30: 01 01 01 01 04 04 04 04 44
CB38: 01 01 01 01 05 05 01 05 4C
CB40: 01 01 01 01 04 04 04 04 54
CB48: 01 01 01 01 05 05 01 03 5A
CB50: 03 03 03 04 04 04 07 07 73
CB58: 07 07 03 03 03 03 03 05 7A
CB60: 05 05 05 01 01 04 04 01 7A
CB68: 01 05 05 01 01 01 05 05 80
CB70: 06 07 08 77 78 79 12 26 27
CB78: 3A 4E 62 1C 30 44 58 6C B8
CB80: 5F 61 60 A0 A0 A0 5C 5E 3E
CB88: 5D 20 19 0F 15 20 06 0F 78
CB90: 15 0E 04 20 14 12 05 01 04
CB98: 13 15 12 05 21 20 20 20 59
CBA0: 20 0E 0F 14 08 09 0E 07 18
CBA8: 20 02 15 14 20 04 09 12 33
CBB0: 14 21 20 20 20 20 20 19 9F
CBB8: 0F 15 20 06 0F 15 0E 04 39
CBC0: 20 01 20 03 0C 15 05 21 4C
CBC8: 20 20 20 20 19 0F 15 20 A6
CBD0: 06 0F 15 0E 04 20 19 0F 55
CBD8: 15 12 20 08 0F 0D 05 21 6A
CBE0: 20 19 0F 15 27 12 05 20 9C
CBE8: 01 20 17 09 0E 0E 05 12 5D
CBF0: 2C 20 0D 01 14 05 21 02 87
CBF8: 15 09 0C 04 09 0E 07 20 65
CC00: 01 20 0E 05 17 20 17 0F 91
CC08: 12 0C 04 2E 2E 20 10 12 C8
CC10: 05 13 13 20 06 09 12 05 81
CC18: 20 14 0F 20 02 05 07 09 92
CC20: 0E 20 20 20 19 0F 15 20 EB
CC28: 12 01 0E 20 0F 15 14 20 C1
CC30: 0F 06 20 14 09 0D 05 21 B5
CC38: 20 32 32 32 32 32 32 32 B7
CC40: 32 32 32 32 32 32 32 32 D1
CC48: 32 32 32 32 32 10 10 28 8B
CC50: C6 28 10 10 00 00 00 00 5F
CC58: 00 00 00 00 00 00 00 00 58
CC60: 00 00 00 00 05 06 05 05 75
CC68: 00 00 00 00 00 00 00 00 68
```

EASY80

FROM PAGE 45

```
•10 PRINTCHR$(147)"LOADING AND CHECKING D
 ATA[3"."]"                              HA
•20 FOR X = 4864 TO 5879 :READ A:POKE X,A HJ
•30 CK=CK+A :NEXT: IF CK<>117816 THEN 50  JJ
•40 PRINT"DONE! SYS 4864 TO ACTIVATE.":EN
 D                                       OM
•50 PRINT"ERROR IN DATA STATEMENTS[3"!"]"
 :END                                    OO
•4864 DATA169, 35,141, 12,  3,169, 22,141 BD
•4872 DATA 13,  3,169,126,141, 14,  3,169 GK
•4880 DATA 22,141, 15,  3,169,203,141, 16 BA
•4888 DATA  3,169, 22,141, 17,  3,169,219 HC
•4896 DATA141,252,  2,169, 21,141,253,  2 IN
•4904 DATA 96, 32,  3,136,138, 72,165, 22 HK
```

```
•4912 DATA162, 19,160, 0,140, 0,255, 32 HK
•4920 DATA204,205,165, 23,202, 32,204,205 CK
•4928 DATA104, 32,202,205, 96,162, 14,108 GB
•4936 DATA 0, 3,169, 0, 44,169, 1,141 AF
•4944 DATA176, 10, 32,134, 3, 32,150,175 PA
•4952 DATA 32, 12,175,140, 18, 3,141, 19 GE
•4960 DATA 3, 32,128, 3, 32,150,175, 32 PF
•4968 DATA 12,175,132,253,133,254, 32,128 GK
•4976 DATA 3, 32,150,175, 32, 12,175,132 DN
•4984 DATA251,133,252,160, 0,132,250, 32 DB
•4992 DATA134, 3,240, 15, 32,128, 3, 32 JB
•5000 DATA150,175, 32, 12,175,192, 16,176 PH
•5008 DATA180,132,250, 32,238, 19,173,176 NF
•5016 DATA 10,208, 43,169,251,141,185, 2 NF
•5024 DATA 32,216,205,166,250, 32,119,255 GP
•5032 DATA200,208, 2,230,252,173, 18, 3 EC
•5040 DATA 56,233, 1,141, 18, 3,176, 3 AE
•5048 DATA206, 19, 3,173, 19, 3,208,224 DH
•5056 DATA173, 18, 3,208,219, 96,169,251 JB
•5064 DATA166,250, 32,116,255, 32,202,205 AP
•5072 DATA200,208, 2,230,252,173, 18, 3 EK
•5080 DATA 56,233, 1,141, 18, 3,176, 3 FM
•5088 DATA206, 19, 3,173, 19, 3,208,222 OB
•5096 DATA173, 18, 3,208,217, 96,160, 0 ED
•5104 DATA140, 0,255,165,254,162, 18, 32 PO
•5112 DATA204,205,232,165,253, 32,204,205 AF
•5120 DATA 96,169, 0,133,251,141, 0,255 DM
•5128 DATA133,250,133,183,162, 18, 32,204 FD
•5136 DATA205,232, 32,204,205,169, 4,170 KF
•5144 DATA160, 7, 32,186,255, 32,192,255 JD
•5152 DATA162, 4, 32,201,255, 32,216,205 FC
•5160 DATA 32, 80, 20, 32,210,255,230,250 BJ
•5168 DATA165,250,201, 80,144,239,169, 13 IG
•5176 DATA 32,210,255,169, 0,133,250,230 MC
•5184 DATA251,165,251,201, 25,144,222,169 LB
•5192 DATA 4, 32,195,255, 32,204,255, 96 DI
•5200 DATA 72, 41, 64,141,109, 20,104, 41 HK
•5208 DATA 63,201, 32,176, 2, 9, 64, 72 LD
•5216 DATA173,109, 20,201, 64,208, 4,104 CN
•5224 DATA 9,128, 96,104, 96, 0, 32,134 CP
•5232 DAfA 3, 32,150,175,165,100,133,251 JG
•5240 DATA165,101,133,252,165, 99,133,250 GG
•5248 DATA165,102,164,103, 32,224,135, 32 DK
•5256 DATA128, 3,208, 3, 76, 44, 21, 32 BG
•5264 DATA150,175, 32, 12,175,132,253,133 CK
•5272 DATA254, 32,128, 3,208, 3, 76, 44 FF
•5280 DATA 21, 32,150,175, 32, 12,175,140 CN
•5288 DATA 18, 3,141, 19, 3,165,254,205 MA
•5296 DATA 19, 3,144, 12,240, 3, 76, 69 AG
•5304 DATA 19,165,253,205, 18, 3,176,246 KD
•5312 DATA160, 0,165,250, 24,105, 4, 72 MG
•5320 DATA169,251,162, 1, 32,116,255,153 NH
•5328 DATA248, 22,200,198,250,208,241,104 MB
•5336 DATA133,250,169, 44,153,248, 22,153 NP
•5344 DATA250, 22,200,169, 80,153,248, 22 HL
•5352 DATA200,200,169, 87,153,248, 22, 32 KK
•5360 DATA187, 21,162, 2, 32,201,255,165 GG
•5368 DATA253, 32,210,255,165,254, 32,210 LA
•5376 DATA255, 32,238, 19, 32,216,205, 32 BJ
•5384 DATA210,255,165,253, 24,105, 1,133 MH
•5392 DATA253,144, 2,230,254,165,254,205 MF
•5400 DATA 19, 3,144,232,165,253,205, 18 PA
•5408 DATA 3,208,225,169, 2, 32,195,255 FF
•5416 DATA 32,204,255, 96,162, 1,108, 0 EL
•5424 DATA 3, 32,134, 3, 32,150,175,165 GJ
•5432 DATA 99,133,250,160, 0,169,100,162 GD
•5440 DATA 1, 32,116,255,153,248, 22,200 IM
•5448 DATA198, 99,208,241,165,102,164,103 DM
•5456 DATA 32,224,135,169, 0,141,176, 10 DI
•5464 DATA 32,134, 3,240, 16, 32,128, 3 LA
•5472 DATA 32,150,175, 32, 12,175,132,253 AP
•5480 DATA133,254, 76,112, 21,238,176, 10 OK
•5488 DATA 32,187, 21,162, 2, 32,198,255 HD
•5496 DATA173,176, 10,240, 13, 32,228,255 OD
•5504 DATA133,253, 32,228,255,133,254, 76 IF
•5512 DATA144, 21, 32,228,255, 32,228,255 MC
•5520 DATA 32,238, 19, 32,228,255, 32,202 PB
•5528 DATA205,165,144,240,246,169, 2, 32 HJ
•5536 DATA195,255, 32,204,255, 96, 32, 3 FC
•5544 DATA136,164, 23,208,115,138,166, 22 DI
•5552 DATA224, 37,176,108,140, 0,255, 32 CG
•5560 DATA204,205, 96,169, 0,141, 0,255 BB
•5568 DATA169, 2,168,162, 8, 32,186,255 PJ
•5576 DATA169, 0,170, 32,104,255,165,250 OL
•5584 DATA162,248,160, 22, 32,189,255, 32 LI
•5592 DATA192,255, 96,201, 13,176, 35,201 NH
•5600 DATA 12,240, 32, 32, 86,121, 32, 12 HB
•5608 DATA175,162, 0,142, 0,255,162, 18 KM
•5616 DATA 32,204,205,152,232, 32,204,205 AB
•5624 DATA 32,216,205,168,169, 0, 32, 3 KE
•5632 DATA175, 24, 96, 32, 86,121, 32, 12 JO
•5640 DATA175,164, 23,208, 19,166, 22,224 IF
•5648 DATA 37,176, 13,140, 0,255, 32,218 EL
•5656 DATA205,168,169, 0, 32, 3,175, 96 AD
•5664 DATA 76, 69, 19,133, 2,160, 88,169 JF
•5672 DATA 22, 32,226, 67,144, 8,105,166 FO
•5680 DATA162, 0, 24, 76, 33, 67,160, 77 BH
•5688 DATA169, 22, 32,226, 67,144, 8,105 JL
•5696 DATA138,162,255, 24, 76, 33, 67, 56 PK
•5704 DATA165, 2, 76, 33, 67, 86, 80, 69 IH
•5712 DATA 69,203, 86, 82, 69, 65,196, 0 JN
•5720 DATA 86, 80, 79, 75,197, 86, 83, 65 IO
•5728 DATA 86,197, 86, 76, 79, 65,196, 86 NO
•5736 DATA 66, 82, 73, 78,199, 86, 83, 69 JF
•5744 DATA 78,196, 86, 68, 85, 77,208, 86 KN
•5752 DATA 87, 82, 73, 84,197, 0,224, 0 CM
•5760 DATA208, 31,201, 46,176, 23,233, 38 IH
•5768 DATA168,185,196, 22,133, 36,169, 22 JG
•5776 DATA133, 37,169, 88, 24,101, 36,144 PD
•5784 DATA 2,230, 37,133, 36, 24, 76,205 HI
•5792 DATA 81,201, 13,176,249,201, 12,240 AC
•5800 DATA 11,169, 77,133, 36,169, 22,133 OJ
•5808 DATA 37, 76,205, 81,169, 0, 32,210 MM
•5816 DATA255,169, 82,133, 36,169, 22,133 DE
•5824 DATA 37, 76,205, 81, 0, 5, 10, 15 KD
•5832 DATA 21, 26, 31,201, 46,176, 16,233 DH
```

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•5840 DATA 38,168,185,241, 22,168,185,227 HM
•5848 DATA 22, 72,136,185,227, 22, 72, 24 OH
•5856 DATA 76,169, 75, 40, 19,109, 20, 48 LM
•5864 DATA 21, 73, 19, 76, 19, 0, 20,165 HG
•5872 DATA 21, 1, 3, 5, 7, 9, 11, 13 LA
```

INSERT
FROM PAGE 48

Starting address in hex: C000
Ending address in hex: C647
SYS to start: 49152

***Flankspeed* required for entry! See page 59.**

```
C000: 4C 64 C0 00 00 00 00 00 71
C008: 00 00 00 00 00 00 00 00 08
C010: 00 00 00 00 00 00 00 00 10
C018: 00 00 00 00 00 00 00 00 18
C020: 00 01 0A 64 E8 10 00 00 88
C028: 00 03 27 23 00 00 00 00 75
C030: 00 00 00 00 00 20 42 45 D7
C038: 49 4E 47 20 49 4E 53 45 67
C040: 52 54 45 44 8D 20 49 53 BA
C048: 20 55 4E 52 45 41 44 41 6A
C050: 42 4C 45 A8 20 49 53 20 A9
C058: 4E 4F 54 20 4F 4E 20 44 6C
C060: 49 53 4B 8D A9 00 85 3A 3F
C068: 20 90 FF A9 93 20 D2 FF 49
C070: 20 2F C6 20 C9 FF A9 49 63
C078: 20 D2 FF A9 0F 20 C3 FF 08
C080: 20 CC FF A5 2D 8D 07 C0 95
C088: A5 2E 8D 08 C0 A5 2B 85 09
C090: FB A5 2C 85 FC A0 04 B1 37
C098: FB C9 22 F0 08 20 1D C6 7D
C0A0: D0 F3 4C D8 C5 A4 FC 8C 7E
C0A8: 0A C0 A5 FB 8D 09 C0 18 84
C0B0: 69 05 90 01 C8 20 87 B4 D5
C0B8: A5 19 A6 1A A4 1B 20 BD D5
C0C0: FF A9 19 85 16 A9 01 A2 6C
C0C8: 08 A0 00 20 BA FF A9 00 F5
C0D0: AE 07 C0 AC 08 C0 20 D5 B2
C0D8: FF 8E 0F C0 8C 10 C0 20 B4
C0E0: C1 F5 20 2F C6 20 C6 FF 95
C0E8: 20 CF FF 85 FD 20 CF FF 4C
C0F0: 85 FE 20 E7 FF A5 FD A6 C7
C0F8: FE C9 36 D0 04 E0 32 F0 D0
C100: 26 C9 30 D0 06 E0 30 D0 D8
C108: 02 F0 24 A0 10 20 CA C5 80
C110: A5 FD 20 D2 FF A5 FE 20 6B
C118: D2 FF A9 29 20 D2 FF A9 5A
C120: 0D 20 D2 FF 4C 9D C0 A0 6B
C128: 1F 20 CA C5 4C 9D C0 A0 43
C130: 00 20 CA C5 AD 07 C0 AC 03
C138: 08 C0 20 37 A5 AD 07 C0 73
C140: 85 FB AD 08 C0 85 FC A9 64
C148: 06 8D 0D C0 A9 00 8D 0E EE
C150: C0 20 1D C6 F0 11 18 AD DC
C158: 0D C0 69 06 90 03 EE 0E 26
C160: C0 8D 0D C0 4C 51 C1 AD 89
C168: 09 C0 85 FB AD 0A C0 85 B1
C170: FC A0 00 B1 FB 8D 11 C0 1B
C178: C8 B1 FB 8D 12 C0 18 AD 15
C180: 09 C0 6D 0D C0 8D 15 C0 E8
C188: AD 0A C0 6D 0E C0 8D 16 E0
C190: C0 38 AD 11 C0 ED 09 C0 C0
C198: 8D 0B C0 AD 12 C0 ED 0A 6A
C1A0: C0 8D 0C C0 AD 0C C0 38 6E
C1A8: CD 0E C0 F0 04 B0 19 90 94
C1B0: 0B AD 0B C0 38 CD 0D C0 09
C1B8: F0 17 B0 0C 20 7A C5 20 FD
C1C0: 4B C5 20 A2 C5 4C D1 C1 3A
C1C8: 20 8E C5 20 E9 C4 20 B6 E2
C1D0: C5 AD 09 C0 85 FB AD 0A 47
C1D8: C0 85 FC A0 04 D0 02 A0 34
C1E0: 00 A9 FF 91 FB C8 C0 05 A6
C1E8: 30 F9 A9 00 91 FB 18 A5 08
C1F0: FB 69 06 90 02 E6 FC 85 58
C1F8: FB AD 15 C0 C5 FB D0 DF EA
C200: AD 16 C0 C5 FC D0 D8 A5 96
C208: 2B A4 2C 20 37 A5 AD 07 B5
C210: C0 AD 08 C0 20 37 A5 A5 E9
C218: 2B 85 FB A5 2C 85 FC A0 B9
C220: 02 B1 FB 8D 05 C0 C8 B1 9D
C228: FB 8D 06 C0 20 0D C3 AD 17
C230: 14 C0 8D 08 C0 18 AD 13 34
C238: C0 69 02 90 03 EE 08 C0 AF
C240: 8D 07 C0 AC 08 C0 20 37 62
C248: A5 A5 2B 85 FB A5 2C 85 97
C250: FC A0 04 B1 FB C9 FF F0 5A
C258: 05 20 1D C6 D0 F3 A0 02 C8
C260: B1 FB 8D 05 C0 C8 B1 FB D7
C268: 8D 06 C0 A5 FB 8D 09 C0 B5
C270: A5 FC 8D 0A C0 20 1D C6 6F
C278: A0 04 B1 FB C9 FF F0 F5 7B
C280: A5 FB 8D 15 C0 A5 FC 8D B5
C288: 16 C0 AD 07 C0 85 FB AD 04
C290: 08 C0 85 FC 20 0D C3 AD 7A
C298: 15 C0 8D 11 C0 AD 16 C0 52
C2A0: 8D 12 C0 38 AD 0F C0 E9 A0
C2A8: 02 B0 03 CE 10 C0 8D 0F 9A
C2B0: C0 38 AD 0F C0 ED 07 C0 DC
C2B8: 8D 0B C0 AD 10 C0 ED 08 86
C2C0: C0 8D 0C C0 CD 0E C0 D0 49
C2C8: 08 AD 0B C0 CD 0D C0 F0 D6
C2D0: 09 20 8E C5 20 4B C5 20 9F
C2D8: A2 C5 AD 08 C0 8D 12 C0 18
C2E0: AD 07 C0 8D 11 C0 38 ED DB
C2E8: 09 C0 8D 0B C0 AD 08 C0 82
C2F0: ED 0A C0 8D 0C C0 20 E9 0E
C2F8: C4 A5 2B A4 2C 20 37 A5 5C
C300: AD 09 C0 85 FB AD 0A C0 71
C308: 85 FC 4C 95 C0 A5 FB 8D 5C
C310: 03 C0 A5 FC 8D 04 C0 A0 69
C318: 03 C8 B1 FB D0 08 20 1D A7
C320: C6 D0 F4 4C B2 C4 C9 22 5C
C328: D0 0B C8 B1 FB F0 EF C9 25
```

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C330: 22 F0 E6 D0 F5 C9 8F F0 3B
C338: E5 C9 83 F0 E1 C9 89 F0 82
C340: 0A C9 8D F0 06 C9 A7 F0 FA
C348: 02 D0 CE C8 B1 FB C9 20 4A
C350: D0 02 F0 F7 8D 1E C0 8C 05
C358: 17 C0 20 EE C5 A2 00 AD 55
C360: 1E C0 85 FE C9 23 D0 02 83
C368: F0 0B C9 30 30 11 C9 3A A3
C370: 10 0D 9D 2C C0 C8 E8 B1 7B
C378: FB 8D 1E C0 4C 6A C3 A5 01
C380: FE C9 23 D0 03 4C A5 C4 F6
C388: E0 00 D0 03 4C 1A C3 8C F3
C390: 18 C0 8A A8 8E 1B C0 A2 A9
C398: 00 88 B9 2C C0 C9 30 F0 B2
C3A0: 1D 38 E9 30 48 18 AD 31 4F
C3A8: C0 7D 21 C0 8D 31 C0 AD F5
C3B0: 32 C0 7D 26 C0 8D 32 C0 88
C3B8: 68 38 E9 01 D0 E6 E8 C0 A5
C3C0: 00 D0 D6 A9 00 8D 0C C0 6C
C3C8: 8D 1C C0 AD 05 C0 8D 33 67
C3D0: C0 AD 06 C0 8D 34 C0 A5 2E
C3D8: FB 8D 19 C0 A5 FC 8D 1A 86
C3E0: C0 AD 03 C0 85 FB AD 04 46
C3E8: C0 85 FC A0 02 B1 FB CD 4A
C3F0: 31 C0 D0 08 C8 B1 FB CD FF
C3F8: 32 C0 F0 27 20 1D C6 F0 F8
C400: 11 18 AD 33 C0 69 0A 90 CE
C408: 03 EE 34 C0 8D 33 C0 4C BC
C410: EB C3 A9 01 8D 1C C0 AD 82
C418: 31 C0 8D 33 C0 AD 32 C0 2C
C420: 8D 34 C0 A9 2C 85 FB A9 A3
C428: C0 85 FC AD 34 C0 AE 33 EF
C430: C0 20 F9 C5 18 6D 1C C0 33
C438: 8D 1D C0 AC 18 C0 AD 19 EF
C440: C0 85 FB AD 1A C0 85 FC 8D
C448: 8D 12 C0 18 98 65 FB 90 4B
C450: 03 EE 12 C0 8D 11 C0 AD 22
C458: 1D C0 CD 1B C0 F0 1F 10 FF
C460: 10 38 AD 1B C0 ED 1D C0 FD
C468: 8D 0B C0 20 E9 C4 4C 7E 5B
C470: C4 38 AD 1D C0 ED 1B C0 C2
C478: 8D 0B C0 20 4B C5 A2 01 A6
C480: AD 1C C0 F0 04 CE 1D C0 AC
C488: CA AC 17 C0 BD 2B C0 91 13
C490: FB C8 EC 1D C0 10 03 E8 1C
C498: D0 F2 84 FE A5 FB A4 FC 23
C4A0: 20 37 A5 A4 FE A9 2C CD E4
C4A8: 1E C0 D0 03 4C 4B C3 4C 03
C4B0: 1A C3 A5 FB 8D 13 C0 A5 37
C4B8: FC 8D 14 C0 AD 03 C0 85 0F
C4C0: FB AD 04 C0 85 FC C8 AD 28
C4C8: 05 C0 91 FB C8 AD 06 C0 59
C4D0: 91 FB 20 1D C6 F0 11 18 7C
C4D8: AD 05 C0 69 0A 90 03 EE 42
C4E0: 06 C0 8D 05 C0 4C C6 C4 D2
C4E8: 60 AD 11 C0 85 5F AD 12 6D
C4F0: C0 85 60 38 AD 11 C0 ED 3D
C4F8: 0B C0 85 58 AD 12 C0 ED 11
C500: 0C C0 85 59 38 A5 5F ED D6
C508: 0F C0 A8 84 5A A5 60 ED 53
C510: 10 C0 AA 38 A5 5F E5 5A 09
C518: 85 5F B0 03 C6 60 38 A5 B5
C520: 58 E5 5A 85 58 B0 02 C6 10
C528: 59 B1 5F 91 58 C8 D0 F9 10
C530: E6 60 E6 59 E8 D0 F2 38 9C
C538: AD 0F C0 ED 0B C0 8D 0F 0C
C540: C0 AD 10 C0 ED 0C C0 8D C7
C548: 10 C0 60 AD 11 C0 85 5F DD
C550: AD 12 C0 85 60 AD 0F C0 34
C558: 85 5A AD 10 C0 85 5B 18 AF
C560: AD 0F C0 6D 0B C0 8D 0F B3
C568: C0 85 58 AD 10 C0 6D 0C FE
C570: C0 8D 10 C0 85 59 20 BF 4E
C578: A3 60 38 AD 0D C0 ED 0B 29
C580: C0 8D 0B C0 AD 0E C0 ED 05
C588: 0C C0 8D 0C C0 60 38 AD F5
C590: 0B C0 ED 0D C0 8D 0B C0 71
C598: AD 0C C0 ED 0E C0 8D 0C 69
C5A0: C0 60 18 AD 07 C0 6D 0B C7
C5A8: C0 8D 07 C0 AD 08 C0 6D A2
C5B0: 0C C0 8D 08 C0 60 38 AD 1A
C5B8: 07 C0 ED 0B C0 8D 07 C0 8F
C5C0: AD 08 C0 ED 0C C0 8D 08 87
C5C8: C0 60 B9 35 C0 08 29 7F 4A
C5D0: 20 D2 FF C8 28 10 F3 60 19
C5D8: AD 07 C0 85 AE 85 2D AD E2
C5E0: 08 C0 85 AF 85 2E A9 00 3C
C5E8: 20 5E A6 6C 02 A0 A2 08 C7
C5F0: A9 00 9D 2C C0 CA 10 FA FA
C5F8: 60 85 62 86 63 A2 90 38 96
C600: 20 49 BC 20 DF BD 20 87 8B
C608: B4 20 A6 B6 AA A0 00 E8 6E
C610: CA F0 07 B1 22 91 FB C8 FC
C618: D0 F6 A5 19 60 A0 00 B1 51
C620: FB 85 FD C8 B1 FB 85 FC 98
C628: A5 FD 85 FB B1 FB 60 A9 05
C630: 00 AA A0 FF 20 BD FF A9 03
C638: 0F A2 08 A8 20 BA FF 20 95
C640: C0 FF A2 0F 60 00 00 00 13
```

SACK RACE
FROM PAGE 15

Starting address in hex: C100
Ending address in hex: CF3F
SYS to start: 49408

***Flankspeed* required for entry! See page 59.**

```
C100: 20 E9 C1 20 09 C1 4C 6B 6E
C108: CD 78 AD 1A D0 09 01 8D 7E
C110: 1A D0 A9 7F 8D 0D DC A9 45
C118: 00 8D 3C 03 8D 12 D0 AD 03
C120: 11 D0 29 7F 8D 11 D0 A9 C3
C128: C1 8D 15 03 A9 33 8D 14 0E
C130: 03 58 60 AD 19 D0 29 01 AD
C138: D0 08 A9 01 8D 19 D0 4C 7F
```

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C140: 81 EA A9 01 8D 19 D0 A5 74
C148: FB 48 A5 FC 48 A9 00 85 A6
C150: FB A9 C0 85 FC A2 00 EC C8
C158: 3C 03 F0 0B 18 A5 FB 69 B6
C160: 07 85 FB E8 4C 57 C1 A0 D7
C168: 00 A2 02 B1 FB 9D 00 D0 29
C170: E8 E8 C8 C0 07 D0 F4 18 B0
C178: A5 FB 69 23 85 FB A0 00 C8
C180: A2 02 B1 FB 9D 01 D0 E8 2B
C188: E8 C8 C0 07 D0 F4 18 A5 85
C190: FB 69 23 85 FB A0 00 B1 EC
C198: FB 99 F9 07 C8 C0 07 D0 90
C1A0: F6 18 A5 FB 69 23 85 FB 5F
C1A8: A0 00 B1 FB 99 28 D0 C8 52
C1B0: C0 07 D0 F6 AE 3C 03 BD EB
C1B8: 8C C0 8D 10 D0 BD 91 C0 84
C1C0: 8D 15 D0 AE 3C 03 E8 E0 EB
C1C8: 04 D0 02 A2 00 8E 3C 03 10
C1D0: BD D3 CB 8D 12 D0 68 85 8C
C1D8: FC 68 85 FB AD 0D DC 29 80
C1E0: 01 F0 03 4C 31 EA 4C 81 0C
C1E8: EA AD 0E DC 29 FE 8D 0E 30
C1F0: DC A5 01 29 FB 85 01 A2 C2
C1F8: 00 BD 00 D0 9D 00 30 BD 13
C200: 00 D1 9D 00 31 BD 00 D2 31
C208: 9D 00 32 BD 00 D3 9D 00 07
C210: 33 E8 D0 E5 A2 00 BD D7 1B
C218: CB 9D 00 34 E8 E0 20 D0 70
C220: F5 A5 01 09 04 85 01 AD FD
C228: 0E DC 09 01 8D 0E DC 60 F5
C230: A2 00 BD F8 CB 20 D2 FF 48
C238: E8 E0 5A D0 F5 A2 0A A9 79
C240: 81 9D A0 04 9D 68 05 9D AC
C248: 30 06 9D F8 06 A9 06 9D 68
C250: A0 D8 9D 68 D9 9D 30 DA 52
C258: 9D F8 DA A9 83 9D C8 04 61
C260: 9D 90 05 9D 58 06 9D 20 4D
C268: 07 A9 0E 9D C8 D8 9D 90 94
C270: D9 9D 58 DA 9D 20 DB E8 9D
C278: E0 28 D0 C3 A9 00 8D 20 6D
C280: D0 8D 21 D0 AD 18 D0 29 90
C288: F0 09 0C 8D 18 D0 A9 80 2F
C290: 8D A9 04 8D 71 05 8D 39 96
C298: 06 8D 01 07 A9 82 8D D1 BF
C2A0: 04 8D 99 05 8D 61 06 8D 53
C2A8: 29 07 A9 06 8D A9 D8 8D 26
C2B0: 71 D9 8D 39 DA 8D 01 DB 08
C2B8: 8D D1 D8 8D 99 D9 8D 61 E0
C2C0: DA 8D 29 DB 18 A0 00 A2 89
C2C8: 17 20 F0 FF A2 00 BD 52 A3
C2D0: CC 20 D2 FF E8 E0 4B D0 76
C2D8: F5 AD 40 03 C9 02 F0 0E 8A
C2E0: A2 00 8A 9D C0 DB E8 E0 12
C2E8: 27 D0 F8 8D 43 03 60 A9 B7
C2F0: FF 8D 1C D0 A9 01 8D 26 C9
C2F8: D0 A9 09 8D 25 D0 A2 00 A2
C300: 8A 9D 00 C0 E8 E0 91 D0 15
C308: F8 A2 00 A9 46 9D 23 C0 15
C310: A9 6E 9D 2A C0 A9 96 9D 8E
C318: 31 C0 A9 BE 9D 38 C0 A9 B2
C320: 01 9D 91 C0 E8 E0 07 D0 B2
C328: E2 8D 4C 03 A9 FE 8D 8C AA
C330: C0 8D 8D C0 8D 8E C0 8D 37
C338: 8F C0 A2 00 8E 4D 03 E8 F2
C340: BD AD CC 8D 01 D0 A9 35 B6
C348: 8D 00 D0 8D 4E 03 A9 01 30
C350: 8D 17 D0 8D 1D D0 8D 52 21
C358: 03 8D 53 03 18 A9 05 6D 73
C360: 3F 03 8D 27 D0 A9 F8 8D 58
C368: F8 07 60 CE 53 03 AD 53 EE
C370: 03 F0 01 60 AD 54 03 8D 58
C378: 53 03 A2 00 86 02 A9 00 A3
C380: 85 FB A9 C0 85 FC A2 00 91
C388: E4 02 F0 0B 18 A5 FB 69 8E
C390: 07 85 FB E8 4C 88 C3 A0 3B
C398: 00 B1 FB AA CA 8A 85 FD C9
C3A0: C9 FF D0 0B A6 02 BD 8C 39
C3A8: C0 39 B1 CC 9D 8C C0 A5 B1
C3B0: FD 91 FB C8 C0 07 D0 E1 7F
C3B8: E6 02 A5 02 C9 04 D0 BE A6
C3C0: 4C EE C4 A2 00 A0 00 BD C1
C3C8: 46 03 4A 4A 4A 4A 18 69 BC
C3D0: 30 99 A4 07 C8 BD 46 03 16
C3D8: 29 0F 18 69 30 99 A4 07 08
C3E0: C8 E8 E8 C0 06 D0 E0 A2 96
C3E8: 00 A0 00 BD 47 03 4A 4A 26
C3F0: 4A 4A 18 69 30 99 CC 07 A4
C3F8: C8 BD 47 03 29 0F 18 69 83
C400: 30 99 CC 07 C8 E8 E8 C0 F8
C408: 06 D0 E0 60 AD 42 03 18 2B
C410: 69 30 8D BC 07 AD 43 03 EE
C418: 18 69 30 8D E4 07 60 AD 51
C420: 44 03 4A 4A 4A 4A 18 69 12
C428: 30 8D B3 07 AD 44 03 29 BE
C430: 0F 18 69 30 8D B4 07 AD E7
C438: 45 03 4A 4A 4A 4A 18 69 2B
C440: 30 8D DB 07 AD 45 03 29 FF
C448: 0F 18 69 30 8D DC 07 60 DA
C450: A9 00 8D 46 03 8D 47 03 A8
C458: 8D 48 03 8D 49 03 8D 4A E2
C460: 03 8D 4B 03 8D 3D 03 8D 9A
C468: 3F 03 A9 01 8D 3E 03 8D B1
C470: 44 03 8D 45 03 A9 03 8D C7
C478: 42 03 8D 43 03 20 0C C4 82
C480: 20 C3 C3 4C 1F C4 AE 3F 46
C488: 03 BD 44 03 85 02 A2 00 BA
C490: 8E 4F 03 8E 50 03 18 AD 19
C498: 4F 03 69 0E 8D 4F 03 AD EF
C4A0: 50 03 69 00 8D 50 03 78 B6
C4A8: F8 38 A5 02 E9 01 85 02 F3
C4B0: D8 58 A5 02 D0 E0 AE 3F 29
C4B8: 03 BD 44 03 4A 4A 4A 4A E9
C4C0: 85 02 A9 00 85 FB A0 00 14
C4C8: 18 A5 FB 65 02 85 FB C8 34
C4D0: C0 0A D0 F4 BD 44 03 29 8F
C4D8: 0F 18 65 FB C9 2C 90 02 E9
C4E0: A9 2C 4A 85 FB 38 A9 19 7D
C4E8: E5 FB 8D 54 03 60 CE 3E 1D
```

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C4F0: 03 AD 3E 03 F0 01 60 A9 DE
C4F8: 06 8D 3E 03 AD 04 DC 29 85
C500: 01 D0 01 60 EE 3D 03 AD 10
C508: 3D 03 C9 04 D0 05 A9 00 95
C510: 8D 3D 03 A0 00 AE 3D 03 6D
C518: B9 B8 CC 3D 91 C0 F0 06 DD
C520: C8 C0 07 D0 F3 60 84 02 5C
C528: BD 8C C0 19 B8 CC 9D 8C FB
C530: C0 A9 00 E0 00 F0 07 CA 3E
C538: 18 69 07 4C 33 C5 18 65 83
C540: 02 AA A9 88 9D 00 C0 AC 2A
C548: 3D 03 B9 BF CC 9D 23 C0 50
C550: AD 04 DC 29 07 C9 05 90 6E
C558: 01 60 A8 B9 C3 CC 9D 46 90
C560: C0 B9 CA CC 9D 69 C0 AD E7
C568: 4F 03 D0 06 AD 50 03 D0 63
C570: 01 60 38 AD 4F 03 E9 01 F4
C578: 8D 4F 03 AD 50 03 E9 00 43
C580: 8D 50 03 A4 02 AE 3D 03 F6
C588: BD 91 C0 19 B8 CC 9D 91 66
C590: C0 CE 41 03 A2 20 8E 12 C7
C598: D4 E8 8E 12 D4 60 A9 00 D5
C5A0: AA 9D 00 D4 E8 E0 18 D0 70
C5A8: F8 A9 0F 8D 18 D4 A9 21 9F
C5B0: 8D 05 D4 A9 0A 8D 01 D4 2F
C5B8: 8D 0F D4 A9 08 8D 0C D4 4A
C5C0: A9 0D 8D 08 D4 A9 53 8D 6C
C5C8: 13 D4 60 AC 4C 03 B9 91 58
C5D0: C0 85 FB B9 8C C0 85 FC 9C
C5D8: 18 AD 00 D0 69 20 85 FD 7C
C5E0: 84 FE A2 00 8A 18 65 FE 0E
C5E8: E8 E0 07 D0 F8 85 FE A2 AA
C5F0: 00 A5 FB 3D B8 CC F0 2A 70
C5F8: A5 FC 3D B8 CC D0 23 8A DC
C600: 18 65 FE A8 B9 00 C0 C5 65
C608: FD B0 17 A9 00 99 00 C0 D1
C610: 99 23 C0 AC 4C 03 B9 91 D4
C618: C0 3D B1 CC 99 91 C0 20 A0
C620: 2A C6 E8 E0 07 D0 CA 4C C9
C628: C3 C3 A0 20 8C 0B D4 C8 A5
C630: 8C 0B D4 AC 3F 03 78 F8 FC
C638: 18 B9 4A 03 69 01 99 4A A5
C640: 03 B9 48 03 69 00 99 48 93
C648: 03 B9 46 03 69 00 99 46 97
C650: 03 D8 58 60 A0 00 AD 91 C4
C658: C0 0D 92 C0 0D 93 C0 0D E7
C660: 94 C0 C9 01 D0 0C AD 4F 5A
C668: 03 D0 07 AD 50 03 D0 02 17
C670: A0 02 8C 51 03 A0 00 84 19
C678: FB 84 02 A9 C0 85 FC A2 8A
C680: 00 86 FD 84 FE A4 02 B9 E8
C688: 46 C0 49 FF AA 38 A4 02 62
C690: B9 00 C0 FD D1 CC A6 FD 4C
C698: A4 FE 90 61 C9 4A B0 5D 50
C6A0: BD 8C C0 39 B8 CC D0 55 90
C6A8: BD 91 C0 39 B8 CC F0 4D B5
C6B0: A9 00 8D 5F 03 B9 B8 CC 89
C6B8: 49 FF 3D 91 C0 8D 5C 03 7E
C6C0: BD 91 C0 8D 5D 03 A9 25 8D
C6C8: 8D 5E 03 A2 60 A0 00 88 E3
C6D0: D0 FD CA D0 FA AD 5F 03 46
C6D8: 49 01 8D 5F 03 AA 18 A9 7F
C6E0: 20 6D 5F 03 8D 12 D4 BD 03
C6E8: 5C 03 A6 FD 9D 91 C0 CE AB
C6F0: 5E 03 AD 5E 03 D0 D4 A9 B0
C6F8: 01 8D 51 03 60 A6 FD A4 85
C700: FE E6 02 C8 C0 07 F0 03 6C
C708: 4C 81 C6 18 A5 FB 69 07 C6
C710: 85 FB E8 A0 00 E0 04 F0 F0
C718: 03 4C 81 C6 60 CE 52 03 34
C720: AD 52 03 F0 01 60 A9 06 25
C728: 8D 52 03 AD 00 DC 49 0F ED
C730: 85 02 29 03 D0 05 A9 00 63
C738: 8D 4D 03 A5 02 29 03 F0 DA
C740: 4B AD 4D 03 D0 46 A9 01 4B
C748: 8D 4D 03 A5 02 29 01 F0 E8
C750: 03 CE 4C 03 A5 02 29 02 44
C758: F0 03 EE 4C 03 AD 4C 03 87
C760: C9 FF D0 05 A9 03 8D 4C 86
C768: 03 C9 04 D0 05 A9 00 8D 46
C770: 4C 03 AA BD AD CC 8D 01 31
C778: D0 A9 35 8D 00 D0 CE F8 4E
C780: 07 A9 F8 8D F8 07 EA EA 8D
C788: EA EA EA EA A5 02 29 04 09
C790: F0 0C AE 00 D0 CA E0 34 EC
C798: D0 01 E8 8E 00 D0 A5 02 5A
C7A0: 29 08 F0 0C AE 00 D0 E8 37
C7A8: E0 E0 D0 01 CA 8E 00 D0 66
C7B0: AD 00 D0 29 01 D0 39 A5 09
C7B8: 02 29 0C F0 33 AD F8 07 C1
C7C0: 49 06 8D F8 07 C9 F8 D0 31
C7C8: 09 A2 10 8E 04 D4 E8 8E 63
C7D0: 04 D4 EA EA EA EA EA EA 2B
C7D8: EA EA EA EA EA EA EA EA 30
C7E0: EA EA EA EA EA EA EA EA 38
C7E8: EA EA EA EA EA EA EA EA 40
C7F0: 60 A2 07 A0 09 18 20 F0 CD
C7F8: FF A2 00 BD D8 CC 20 D2 F1
C800: FF E8 E0 17 D0 F5 A9 01 52
C808: 8D 40 03 AD 40 03 C9 01 94
C810: D0 0C A9 01 8D 34 D9 A9 DC
C818: 0B 8D 36 D9 D0 0A A9 01 46
C820: 8D 36 D9 A9 0B 8D 34 D9 0E
C828: AD 00 DC 29 1C 49 1C 85 E2
C830: 02 C9 04 D0 05 A2 01 8E 08
C838: 40 03 C9 08 D0 05 A2 02 C7
C840: 8E 40 03 C9 10 D0 C4 A2 24
C848: 07 A0 09 18 20 F0 FF A9 CB
C850: 20 A2 00 20 D2 FF E8 E0 CF
C858: 17 D0 F8 60 A2 07 A0 0F F2
C860: 18 20 F0 FF A2 00 BD EF D9
C868: CC 20 D2 FF E8 E0 08 D0 CA
C870: F5 18 AD 3F 03 69 31 8D 96
C878: 2E 05 A9 05 85 02 A2 00 84
C880: A0 00 88 D0 FD CA D0 FA 0F
C888: C6 02 A5 02 D0 F4 A2 07 68
C890: A0 0F 18 20 F0 FF A2 00 0C
C898: A9 20 20 D2 FF E8 E0 08 27
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C8A0: D0 F6 60 A9 00 85 FB 85 79
C8A8: FC 85 FD 85 FE 85 FF A2 D5
C8B0: 00 18 A5 FB 65 02 85 FB 53
C8B8: A5 FC 69 00 85 FC E8 E4 15
C8C0: 02 D0 EE 38 A5 FB E5 02 44
C8C8: 85 FB A5 FC E9 00 85 FC 59
C8D0: A2 00 18 A5 FB 65 FD 85 16
C8D8: FD A5 FC 65 FE 85 FE A5 08
C8E0: FF 69 00 85 FF E8 E0 07 A0
C8E8: D0 E8 60 A9 00 8D B0 02 EC
C8F0: AD 00 DC 29 10 F0 F9 A2 42
C8F8: 07 A0 0F 18 20 F0 FF A2 7B
C900: 00 BD EF CC 20 D2 FF E8 56
C908: E0 08 D0 F5 18 AD B0 02 30
C910: 69 31 8D 2E 05 A2 08 A0 B6
C918: 04 18 20 F0 FF A2 00 BD A5
C920: F7 CC 20 D2 FF E8 E0 20 C1
C928: D0 F5 A9 01 85 02 20 A3 E4
C930: C8 A9 00 85 FB A5 02 85 51
C938: FC A5 FC C9 0A 90 0C 38 80
C940: A5 FC E9 0A 85 FC E6 FB 3C
C948: 4C 39 C9 18 A5 FB 69 30 EA
C950: 8D 54 05 A5 FC 69 30 8D 01
C958: 55 05 A5 FB 0A 0A 0A 0A 7C
C960: 05 FC AE B0 02 9D 44 03 A8
C968: A9 00 8D A7 02 8D A8 02 81
C970: 8D A9 02 8D AA 02 4C AB DB
C978: C9 38 A5 FD E9 07 85 FD 92
C980: A5 FE E9 00 85 FE 78 F8 05
C988: 18 AD AA 02 69 07 8D AA A3
C990: 02 AD A9 02 69 00 8D A9 8C
C998: 02 AD A8 02 69 00 8D A8 92
C9A0: 02 AD A7 02 69 00 8D A7 98
C9A8: 02 D8 58 A5 FD D0 CA A5 C0
C9B0: FE D0 C6 18 A2 08 A0 1F C9
C9B8: 20 F0 FF A5 FF D0 BA A2 9D
C9C0: 00 BD A9 02 4A 4A 4A 4A 53
C9C8: 18 69 30 20 D2 FF BD A9 D4
C9D0: 02 29 0F 18 69 30 20 D2 AF
C9D8: FF E8 E0 02 D0 E3 A2 40 3C
C9E0: A0 00 88 D0 FD CA D0 FA 6F
C9E8: AD 00 DC 29 13 49 13 85 91
C9F0: FB 29 01 F0 0C E6 02 A5 A2
C9F8: 02 C9 1A 90 04 A9 01 85 A3
CA00: 02 A5 FB 29 02 F0 0A C6 90
CA08: 02 A5 02 D0 04 A9 19 85 CE
CA10: 02 A5 FB C9 10 F0 03 4C CD
CA18: 2E C9 AE B0 02 AD A9 02 CA
CA20: 9D 57 03 AD AA 02 9D 55 65
CA28: 03 EE B0 02 AD B0 02 CD FA
CA30: 40 03 F0 03 4C F0 C8 60 CD
CA38: AD 8D 02 29 01 F0 08 A9 42
CA40: 06 8D 20 D0 4C 38 CA A9 BD
CA48: 00 8D 20 D0 60 20 30 C2 3A
CA50: 20 0C C4 20 C3 C3 20 1F 28
CA58: C4 20 EF C2 20 9E C5 20 94
CA60: 86 C4 20 5C C8 20 54 C6 2C
CA68: AD 51 03 F0 01 60 20 1D F9
CA70: C7 20 CB C5 20 38 CA 20 2D
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CA78: 6B C3 A2 01 A0 00 88 D0 45
CA80: FD CA D0 FA 4C 65 CA 20 B1
CA88: 50 C4 A9 02 8D 40 03 20 3A
CA90: 30 C2 20 F1 C7 20 EB C8 32
CA98: 20 4D CA AD 51 03 C9 01 9D
CAA0: D0 1F AE 3F 03 DE 42 03 A5
CAA8: A2 20 8E 04 D4 E8 8E 04 4E
CAB0: D4 EE 3F 03 AD 3F 03 CD 74
CAB8: 40 03 D0 05 A9 00 8D 3F 48
CAC0: 03 AD 51 03 C9 02 D0 33 95
CAC8: AE 3F 03 78 F8 18 BD 44 45
CAD0: 03 69 01 9D 44 03 18 BD F8
CAD8: 4A 03 7D 55 03 9D 4A 03 E6
CAE0: BD 48 03 7D 57 03 9D 48 A7
CAE8: 03 BD 46 03 69 00 9D 46 40
CAF0: 03 A9 00 9D 55 03 9D 57 88
CAF8: 03 D8 58 AD 42 03 D0 98 89
CB00: AD 43 03 D0 93 A9 00 8D 8F
CB08: 91 C0 8D 92 C0 8D 93 C0 1D
CB10: 8D 94 C0 A9 03 8D 21 D0 1F
CB18: 8D 20 D0 A2 00 BD 17 CD DB
CB20: 20 D2 FF E8 E0 1C D0 F5 BF
CB28: 18 A2 03 A0 0C 20 F0 FF A3
CB30: A2 00 BD 33 CD 20 D2 FF 84
CB38: E8 E0 11 D0 F5 AD 40 03 CA
CB40: C9 02 D0 39 18 A2 05 A0 76
CB48: 0C 20 F0 FF A2 00 BD 44 0A
CB50: CD 20 D2 FF E8 E0 11 D0 BC
CB58: F5 A2 00 A0 00 BD 47 03 99
CB60: 4A 4A 4A 4A 18 69 30 99 D4
CB68: DE 04 C8 BD 47 03 29 0F 54
CB70: 18 69 30 99 DE 04 C8 E8 50
CB78: E8 E0 06 D0 E0 A2 00 A0 3D
CB80: 00 BD 46 03 4A 4A 4A 4A B0
CB88: 18 69 30 99 8E 04 C8 BD EC
CB90: 46 03 29 0F 18 69 30 99 5D
CB98: 8E 04 C8 E8 E8 E0 06 D0 7D
CBA0: E0 AD 00 DC 29 10 F0 F9 30
CBA8: 18 A2 18 A0 09 20 F0 FF 36
CBB0: A2 00 BD 55 CD 20 D2 FF 27
CBB8: E8 E0 16 D0 F5 AD 00 DC E9
CBC0: 29 10 D0 F9 A9 93 20 D2 F4
CBC8: FF AD 00 DC 29 10 F0 F9 77
CBD0: 4C 87 CA FF 5B 82 A9 00 F6
CBD8: 00 00 00 0F 17 1B 1D 00 37
CBE0: 00 00 00 FF FF FF FF 1E FE
CBE8: 1E 1E 1E 1E 0E 06 02 00 77
CBF0: FF FF FF FF FF FF FF FF F0
CBF8: 08 8E 93 05 2A 20 20 53 E5
CC00: 41 43 4B 20 52 41 43 45 0C
CC08: 20 50 52 4F 47 52 41 4D 42
CC10: 4D 45 44 20 42 59 20 9E 61
CC18: 4A 4F 48 4E 20 46 45 44 38
CC20: 4F 52 05 20 20 2A 2A 2A 85
CC28: 20 43 4F 4E 43 45 50 54 56
CC30: 3A 20 9E 54 4F 4D 20 47 81
CC38: 41 55 54 48 49 45 52 05 51
CC40: 20 26 20 9E 4A 4F 48 4E 75
CC48: 20 46 45 44 4F 52 05 20 FE
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CC50: 2A 2A 20 20 50 4C 41 59 1C
CC58: 45 52 20 23 31 3A 30 30 FE
CC60: 30 30 30 30 30 20 20 4C DD
CC68: 45 56 45 4C 3A 30 30 20 50
CC70: 20 42 41 47 53 3A 30 0D 26
CC78: 20 20 50 4C 41 59 45 52 87
CC80: 20 23 32 3A 30 30 30 30 F0
CC88: 30 30 30 20 20 4C 45 56 41
CC90: 45 4C 3A 30 30 20 20 42 3F
CC98: 41 47 53 3A 30 F9 FA FB CF
CCA0: FC FD FE FF 00 07 0B 05 B1
CCA8: 02 03 08 04 00 46 6E 96 05
CCB0: BE FD FB F7 EF DF BF 7F 70
CCB8: 02 04 08 10 20 40 80 46 FD
CCC0: 6E 96 BE F9 FA FB FC FD 70
CCC8: FE FF 07 0C 05 02 03 08 EC
CCD0: 04 0C 00 00 10 04 10 0A 0F
CCD8: 05 4E 55 4D 42 45 52 20 C8
CCE0: 4F 46 20 50 4C 41 59 45 13
CCE8: 52 53 3A 20 31 20 32 50 BC
CCF0: 4C 41 59 45 52 20 31 53 14
CCF8: 54 41 52 54 49 4E 47 20 34
CD00: 4C 45 56 45 4C 3A 20 30 04
CD08: 30 20 20 42 4F 4E 55 53 01
CD10: 3A 20 30 30 30 30 30 93 EE
CD18: 1F 20 20 20 20 20 20 20 18
CD20: 20 20 20 20 20 20 20 46 47
CD28: 49 4E 41 4C 20 53 43 4F 53
CD30: 52 45 53 50 4C 41 59 45 97
CD38: 52 20 31 3A 20 30 30 30 C6
CD40: 30 30 30 30 50 4C 41 59 38
CD48: 45 52 20 32 3A 20 30 30 EC
CD50: 30 30 30 30 30 50 52 45 29
CD58: 53 53 20 42 55 54 54 4F AE
CD60: 4E 20 54 4F 20 52 45 50 7A
CD68: 4C 41 59 A2 00 BD 7F CD FC
CD70: 9D 00 3E BD 7F CE 9D 00 F5
CD78: 3F E8 D0 F1 4C 87 CA 00 02
CD80: 00 00 00 00 00 00 00 00 80
CD88: 00 00 00 00 05 00 00 17 A4
CD90: 00 00 1F 00 00 0C 00 00 BB
CD98: 28 00 00 28 C0 00 2B 00 D4
CDA0: 00 28 00 00 14 00 00 28 05
CDA8: 00 00 28 00 00 28 00 00 F8
CDB0: 20 00 00 20 00 00 14 00 05
CDB8: 00 00 00 00 00 00 FF 00 B8
CDC0: 00 00 00 00 00 00 00 00 C0
CDC8: 00 00 00 00 00 00 00 00 C8
CDD0: 00 00 00 00 00 00 00 00 D0
CDD8: 00 00 00 00 00 00 00 00 D8
CDE0: 00 00 00 00 00 00 00 00 E0
CDE8: 00 80 00 00 A0 00 00 A8 B2
CDF0: 00 00 AA A0 00 2A A8 00 0F
CDF8: 0A A0 00 00 00 00 00 00 A3
CE00: 00 00 00 00 00 00 00 00 00
CE08: 00 00 00 00 00 00 00 00 08
CE10: 00 00 00 00 00 00 00 00 10
CE18: 00 00 00 00 00 00 00 00 18
CE20: 00 00 00 3C 00 00 FF 00 5C
CE28: 00 BE 00 00 AA 00 00 AA 3C
CE30: 00 00 AA 00 00 AA 00 00 85
CE38: 28 00 00 00 00 00 00 00 60
CE40: 00 00 00 00 00 00 00 00 40
CE48: 00 00 00 00 00 00 00 00 48
CE50: 00 00 00 00 00 00 00 00 50
CE58: 00 00 00 00 00 00 00 00 58
CE60: 00 00 00 00 00 00 0A AA 15
CE68: 00 2A 5A 80 A5 A5 A0 AA 04
CE70: AA A0 A5 A5 A0 2A 5A 80 AC
CE78: 0A AA 00 00 00 00 00 00 2D
CE80: 00 00 00 00 00 00 00 00 80
CE88: 00 00 00 00 00 00 00 00 88
CE90: 00 00 00 00 28 00 00 28 E0
CE98: 00 00 28 00 00 28 00 00 E8
CEA0: AA 00 00 BE 00 00 AA 00 B4
CEA8: 00 AE 00 00 AA 00 00 BA BC
CEB0: 00 00 AE 00 00 AA 00 00 0A
CEB8: AA 00 00 00 00 00 5F 00 C2
CEC0: 00 00 00 00 00 00 00 00 C0
CEC8: 00 00 00 00 00 00 00 00 C8
CED0: 00 00 00 00 00 00 00 00 D0
CED8: 00 00 00 00 00 00 00 00 D8
CEE0: 00 00 00 00 00 00 0A AA 95
CEE8: 02 2A AA 8A AE AA AA AA F8
CEF0: AA AA BA AA 8A 2E AA 02 11
CEF8: 0A A8 00 00 00 00 7F 00 2B
CF00: 00 00 00 00 00 00 00 00 00
CF08: 00 00 00 00 05 00 00 17 24
CF10: 00 00 1F 00 00 0C 00 00 3B
CF18: 28 00 00 28 00 00 28 00 90
CF20: 00 2B 00 00 14 00 00 28 87
CF28: 00 00 28 00 00 22 00 00 72
CF30: A2 00 01 80 90 00 40 40 65
CF38: 00 00 00 00 00 00 FF 00 38
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